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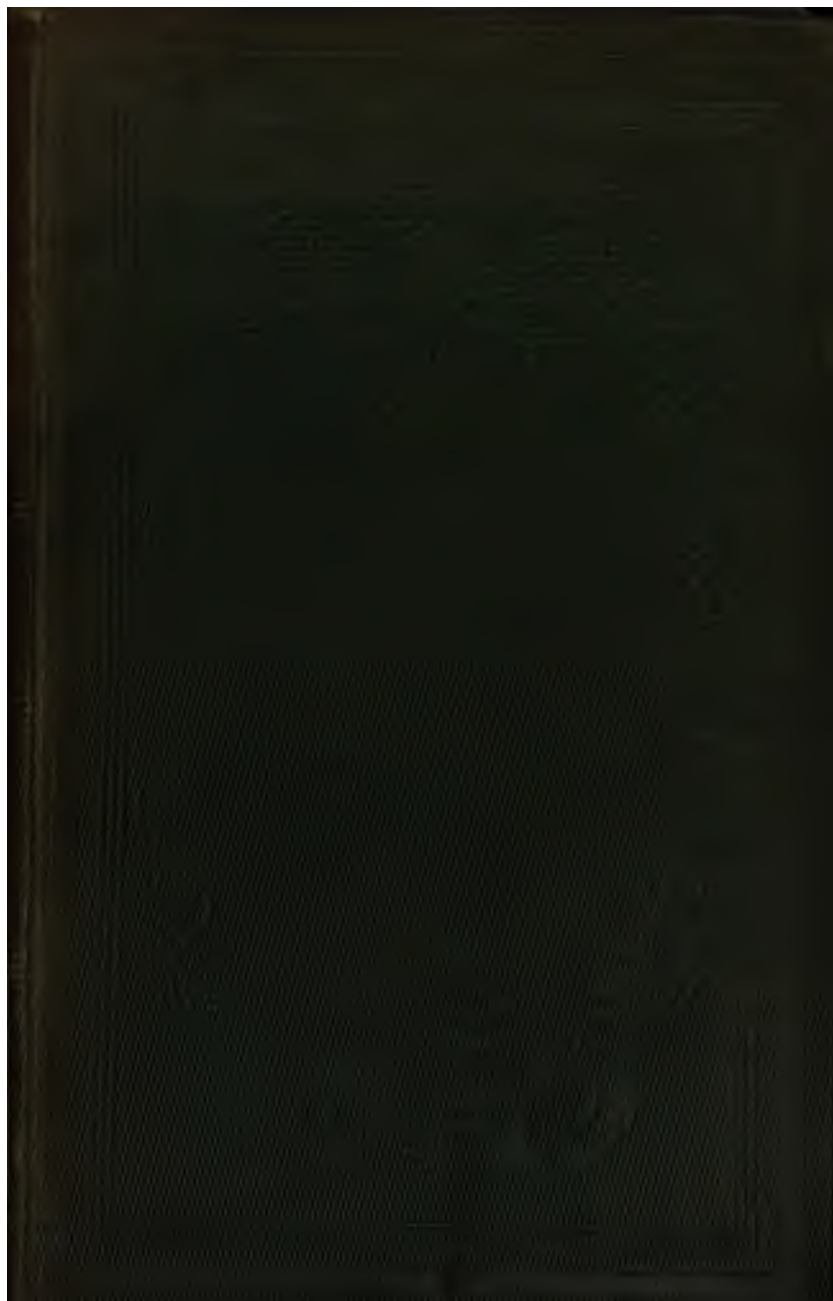
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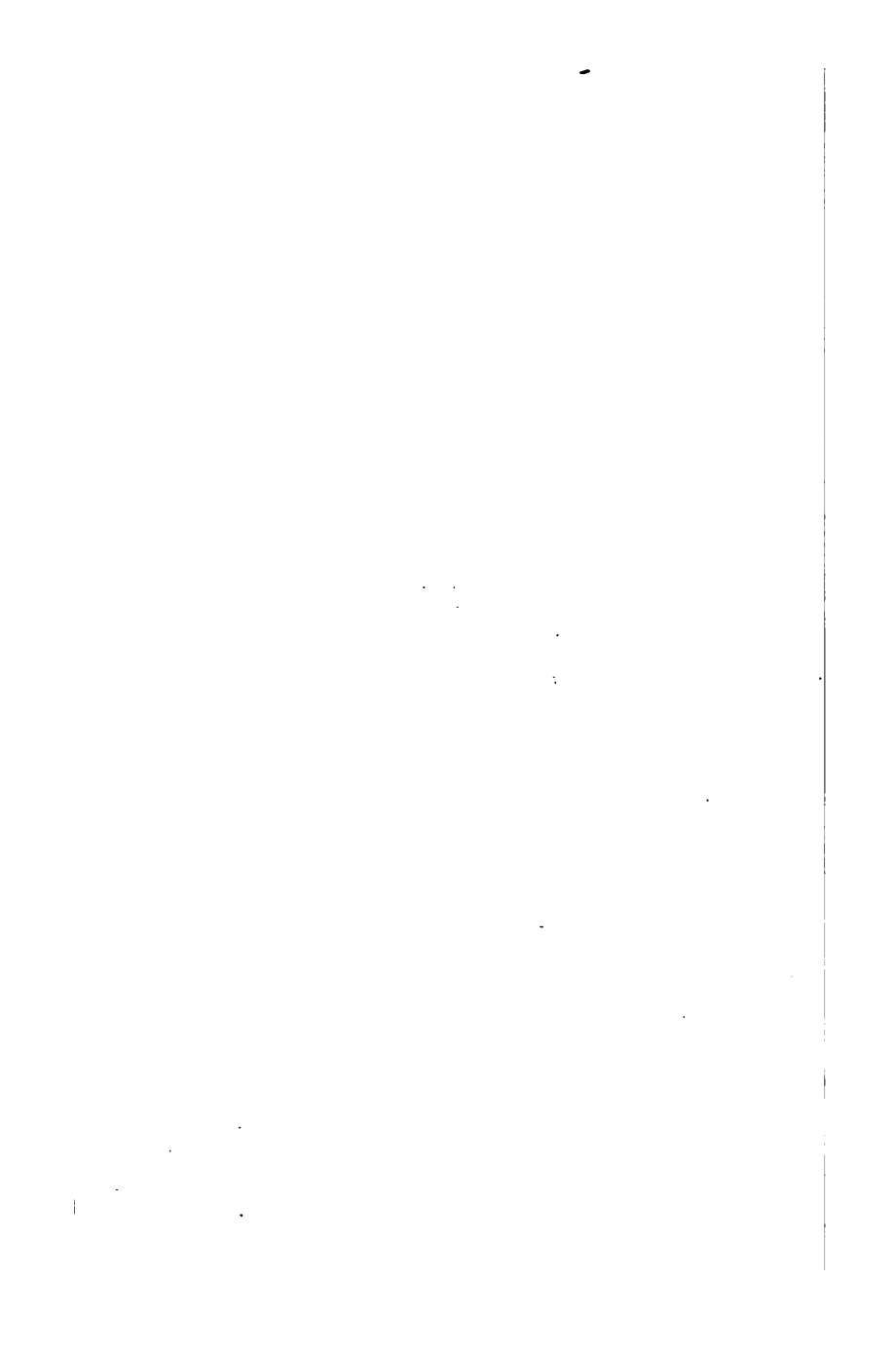
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INVERSNAD WATERFALL.

BOTANICAL RAMBLES.

BY THE

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BOTANICAL RAMBLES.

CHAPTER I.

THE MEADOW.

"What though I trace each herb and flower
That sips the morning dew ;
Did I not own Jehovah's power,
How vain were all I knew !"

You asked me a few days ago, of what use were all the dried plants which I was so carefully fastening to paper ; and you will recollect, perhaps, that I then evaded the question, suffering you for the time to think that I was committing great waste in spoiling so much good paper. When I told you, on another occasion, that, amongst my numerous collection of stones, stained with spots of yellow, and grey, and black, there were none which contained any useful mineral, you seemed yet more surprised. "Had they been specimens of ore," you said, "you could conceive it possible that they might be worth collecting and examining ;" and I saw at the same time (although you expressed no opinion on the subject) that you thought me a sad trifler, devoting, to a very unprofitable subject, time which might advantageously be employed in reading some instructive or even merely entertaining book.

When, on another occasion, I returned from my ramble on the sea-shore, and, instead of resting after my fatiguing walk, set busily to work with my dishes of water, blotting-paper, and calico, floating out the specimens of sea-weed which I had collected, you were yet more puzzled. I did not attempt, however, to satisfy your curiosity, but promised that you should accompany me in my next excursion into the country, when you would probably discover, that I had some motive for my incomprehensible conduct beyond the simple desire of making a collection of all the plants that I met with, and arranging them in packages. That promise I am now about to redeem, premising, that I do not meditate making you *a botanist* during the few rambles which I shall have an opportunity of taking with you; but that my object will be, to bring before your notice some of the many interesting facts which Botany, *if ever you should study that science*, will enable you to discover for yourself.

If you should be tempted to become a naturalist, you will have to study books containing a considerable number of "hard names," which you have never before seen,—of which it will cost you some trouble to find the meaning,—and which you will at first have some difficulty in recollecting. I do not say this to discourage you, but to caution you against falling into an error, now unfortunately very common, *that it is possible to acquire a fair knowledge of any science without industry and pains*. It is true enough, that many of the most important discoveries have been made almost accidentally; that trifling occurrences have led to the most important events; but you will find it a

difficult task to name to me *one* invention in the arts, or *one* discovery in the sciences, which has not been arrived at by pains-taking and thoughtful men, men who were well acquainted with the value of all that had been done before in their respective subjects of investigation, and who had learnt, by dint of hard study and intense application, to turn accident to account. The study of Botany, should you ever be induced to take it up, will be an amusement for your leisure hours; but, unless you set out fully prepared to encounter serious difficulties, and resolved to overcome them, it will be a wearisome amusement, and defeat its own ends. It may happen, that your only gratification during the earlier stages of your progress will be derived from looking back upon the rugged path which you have traversed, when the reflection that you have mastered difficulties which at the outset appeared almost insurmountable, will give you encouragement to proceed against those which yet seem to be obstacles in your way. If, in the course of our rambles, I present you with some of the flowers and fruits of botanical research, you must not forget that they were not attained until many difficulties had been surmounted; and, if you would wish to gather any such for yourself, you can only reach them by undergoing a similar process.

Our first excursion shall be through a Meadow, the produce of which is reserved for making hay. Here you will discover at first, perhaps, nothing very well deserving your notice, for, with the exception of Ox-eye Daisies, and a sprinkling of Red Poppies, there is nothing to be seen but grass. By the term *grass*, farmers mean all plants which serve

as pasture to cattle, or may be converted into hay, or, more accurately, all plants with comparatively small leaves growing in pasture land. Botanists, however, comprehend under the term those plants only which bear long and narrow leaves, jointed stems, and seeds more or less resembling grains of barley or wheat.

Of all vegetable productions the various kinds of grass are, in temperate climates, at once the most generally diffused, and the most important. The different kinds of grass to which the common name of corn is given furnish man and several domestic animals with their principal food; other sorts, which abound in our pasture-lands, afford, in their green state during the spring and summer months, and in the form of hay during winter, an inexhaustible supply of sustenance to cattle; while the stems or straw of the larger kinds, namely, wheat, barley, and oats, are applied to a number of useful purposes, which I need not mention.

In order, therefore, that there may not be wanting a sufficient supply of so valuable a production, the Providence of God has so constituted their nature that they are less liable than any plants with which we are acquainted to become extinct, and less affected by any excess of heat or cold, drought or moisture. Their leaves are, as I have said, long and narrow, and of the same width from the base upwards to nearly the extreme point. Hence it happens, that whenever rain or dew settles on them, it does not drop off, but is conducted as through a channel to the roots. The leaves too, when they have executed their office of supplying the plant with moisture, perform another equally useful by sheltering the immediate neighbourhood

of the root from the rays of the sun; and the plants themselves, by growing not singly but in tufts, afford protection to each other. Some species are perennial, that is, they continue to grow for several years. One of these,* which is very common in meadow pastures, is furnished with roots composed of fine, closely-matted fibres, and in ordinary seasons derives from the soil by the help of these as much nourishment as it needs. But if by any chance it grow in a situation where, from the dryness of the season, the porous nature of the soil, or other cause, such roots would be of little use in a very dry season, the fibres disappear, and the lower joints of the stem acquire a number of juicy balls, strung together like beads, and these supply the leaves and stem with nourishment till the return of rainy weather. Other perennial grasses grow naturally in a soil composed of sand, with a very little mixture of mould. Here fibrous roots would be of little service, for the sand from which they spring becomes perfectly dry after a few days of hot weather, and roots of this description could not reach sufficiently deep to procure a supply of nourishment. Besides this, sand-hills in the neighbourhood of the sea, being necessarily much exposed to the wind, are liable to constant changes. Either the sand is blown away from them, in which case all plants not extending beyond a certain depth would be carried off with it, or the hillock, by the addition of fresh sand, is constantly increasing in size; and in this case, both leaves and stems would soon be buried together. The grasses, therefore, which

* *Phleum pratense*.

grow in such situations, have long wiry leaves which spring from the root far below the surface of the ground, and are little injured, however hard the wind is; they are also furnished with very tough stems, spreading horizontally, not like the runners of the garden strawberry on the surface, but at a depth of many feet in the sand. From the joints of these ascend tufts of such leaves as I have described above, and roots are connected with each tuft. I have sometimes seen these underground stems in places where they have grown through the sides of sand-hills, running along the ground to the distance of twenty or thirty feet. It very frequently happens on the sandy sea-coast, when a storm occurs at new or full moon, (at which periods the tides are highest,) that the repeated lashing of the waves washes away the base of one of these sand-hills. The consequence is, that the sand above falls down and is also carried away by the water, and the sloping hillock is converted into a miniature cliff, the upper surface of which is bound together by an entangled mass of foliage which projects over the side facing the sea; and the numerous interlacing roots are exposed to view, descending from the overhanging turf and penetrating deeply into the sand beneath. The greater part of the coast of Holland, being composed of dykes, upon the security of which the existence of the country depends, the Dutch have turned to advantage the peculiar growth of these grasses, and have planted them wherever the soil is adapted for their growth, that is, wherever danger is most to be apprehended. Several parts of the shores of England are protected from the encroachments of the sea by the same means.

Some other kinds of perennial grass send out new roots from any of the lower joints of the stem which happen to touch the ground. Owing to this providential arrangement, when one portion of the plant is injured or destroyed, the other continues to thrive on its own resources.

Grasses which are annual in their duration, depend more for their preservation upon their seeds than upon their roots. These, by an equally wise provision, are scantily provided with roots and leaves, while their flower-stalks are both abundant and productive. In most kinds of grass too, the seeds, when ripe, are easily detached from the stem, so that when the haymaker tosses about his newly-mown crops for the sake of drying them, he at the same time scatters his field with abundant store of seed for the next season.

I have only to add one or two interesting facts respecting grass, and I shall have done with this subject for the present. If you go into a field which, instead of being reserved for hay, affords pasturage for cattle, you will find that the leaves are cropped almost close down to the ground, and that the young shoots are more numerous and more thickly matted together than they were in the hay-field. Now, you would scarcely suppose that the spreading of the plants is at all promoted by the removal of the young shoots and leaves, but such is the case, for grasses, as well as many other plants, have a strong tendency to send out numerous small branches, if the leading stem be removed. Thus, it appears, that animals when grazing are promoting the growth of their food instead of retarding it. They diminish the actual size of the plant indeed for to-day, but so judi-

ciously that to-morrow finds it more productive than ever. Instinct, in fact, teaches them to treat grass in the same way that man does trees when he cuts a willow or an ash-tree down close to the



POLLARD-ASH.

ground, in order that he may supply himself with rods or poles. But here is another circumstance still more wonderful. In all pasture lands, however closely the grass be nibbled, or even if more animals are sent into them than the space allotted will supply with adequate nourishment, you will always discover scattered here and there a few tall stems bearing spikes of seeds at their tops.

Now how is this to be accounted for? "O," you will say, "cows and sheep prefer the tender leaves to the hard stems, and therefore leave the latter." Just so: but *why* do they prefer the one, and leave the other? The seed-stems were not passed by accidentally, you allow; they must, therefore, have been suffered to remain by design either of the animals or of the all-wise God, who gave to each its peculiar instinct; and if so, what is the object of that design? I will leave you to answer this question for yourself, only helping you to solve it by asking another, viz., From what would the annual grasses spring next year if their seeds, as well as their leaves, were eaten by cattle?

Before we quit the Meadow, I must call your attention to a little flower, which it will be well worth your while to gather and examine very closely. The Daisy,* or, as I suppose, it was originally written, the *day's eye*, received its name from its being a bright, cheerful, light-loving flower, growing in places where it might bask all day long in the rays of the sun. If you look at this attentively, you will discover that it is not in reality one single flower, but an assemblage of perhaps as many as a hundred very small and elegantly-shaped yellow cups, surrounded by a border of white spreading flower-leaves or petals. Now every one of these florets, as they are called, both yellow and white, is a distinct flower of itself, not certainly very large, or growing upon a long stem, like most other flowers, but still a distinct flower. But why, you will ask, are they so different in shape? What reason can there be why those in

* *Bellis perennis*.



THE DAISY.

the centre should be like cups, while those at the border are flat?

I will endeavour to furnish you with a reason. The yellow cups are shaped like bells, and quite open, so that, without some means to prevent such an occurrence, every shower of rain would fill them with water. Now, most bell-shaped flowers, such as the Wild Hyacinth and the different kinds of *Campanula*, hang down their heads, and, therefore, let it rain ever so hard, are kept as dry as if they were sheltered by a thatched roof; but the cups of the Daisy are turned upwards, and, as they cannot shelter themselves, require to be protected by some other means, and here their associates, which form the fringe of white florets, lend their



THE WILD HYACINTH.

aid. These are so constituted, that when either rain or dew is about to fall they slowly rise from

their horizontal position and close over the yellow flowers, forming for them a covering like a tent. Should the weather be still, they remain in their erect position, and whatever wet falls runs down on the outside of the white petals; but if it blows hard, they yield to the wind and present the base of the flower to the driving rain. But in either case the yellow flowers are equally protected from the wet. If you search a meadow on a rainy day, or in the evening after sunset, you will not find a daisy open. Here and there, perhaps, you may discover one which appears to depart from this rule, but on examination you will find that all the central flowers are either dead or withering, and, consequently, stand in no need of protection.

Not worlds on worlds in phalanx deep
 Need we to prove a God is here;
 The daisy fresh from Nature's sleep,*
 Tells of His hand in lines as clear;
 For who but He who arch'd the skies,
 And poured the day-spring's living flood—
 Wondrous alike in all He tries—
 Could raise the daisy's purple bud;
 Mould its green cup, its wiry stem,
 Its fringed border nicely spin,
 And cut the gold-embossed gem
 That, set in silver, gleams within?
 And fling it unrestrain'd and free,
 O'er hill, and dale, and desert sod,
 That man, where'er he walks, may see
 In every step the stamp of God.

DR. MASON GOOD.

There are a great many other flowers which, like the Daisy, are made up of a number of smaller

* This peculiarity in some plants of closing their flowers or leaves has been called "the sleep of plants."

florets; of these, some on the approach of rain close in the same way that the Daisy does, others hang down their heads, or turn away from the rain. The Goat's-beard always shuts its flowers about twelve o'clock. The Sun-flower does not close either by day or night, but keeps its face always turned towards the shining sun.

By what strange mechanism these extraordinary effects are produced, no one has yet discovered. That the plant has not the power of choosing for itself we know very well, for it can no more refuse to obey certain laws which are prescribed for it than it can refuse to grow when planted and fostered by the hand of Providence. May not these things be kept secret from us that we may "see and know, and *consider*, and understand, together, that the hand of the Lord hath done this, and the Holy One of Israel hath created it?"



CHAPTER II.

THE CORN-FIELD.

Rent is the fleecy mantle of the sky;
 The clouds fly different : and the sudden sun
 By fits effulgent gilds th' illumined field,
 And black by fits the shadows sweep along—
 A gaily-checked heart-expanding view :
 Far as the circling eye can shoot around,
 Unbounded tossing in a flood of corn.

THOMSON.

PLANTS which produce the various kinds of grain used as food by men and cattle are included under the general name of *Corn*. They are also sometimes called *Cereal grasses*, from Ceres, an imaginary being, worshipped in ancient times by some heathen nations as the goddess who watched over corn-fields. That the providence of the one true God keeps a close watch over all His works, we know from the teaching of the Sacred Volume; and the experience of every day's life repeats the same lesson in one form or another. We cannot in every case discover what ends our Heavenly Father has in view in creating, protecting, and preserving a vast number of vegetables, and even animals, which to us seem unimportant, or by what means those ends are effected; yet, if we reflect on the particulars which have come under our notice with respect to those which are eminently useful to man, and which have on that account been thought worthy of investigation, we shall discern so much that is fraught with instruc-

tion that we cannot but conclude that nothing has been made in vain, every created thing being designed to fulfil some wise and beneficent purpose. People very frequently ask, what is the use of botany? When they speak thus they mean to say, "What good can accrue to us from the study?" Show them that they may learn from it some new and useful property of a certain herb, and they are content to listen; tell them that they may by examining a leaf catch a glimpse of the creative and protecting wisdom of God, and they are content to leave the study to others, who, they say, are more curious about such things than themselves. Thoughtless selfishness is at the bottom of this. They are willing to learn all that science can teach them, if they can thereby heap up another bushel in their barns; but that which *merely* adds to the glory of God, they do not think it worth their while to inquire into. It was for an equally selfish reason that the heathens worshipped, with peculiar solemnities, the Goddess of Corn, and thought but little of the imaginary deities who presided over those natural objects which seemed to them to be of little use. If their crops were to fail, they knew that they would be exposed to great inconvenience, and they endeavoured to propitiate by offerings her whom they supposed to watch over their corn-fields; but it mattered not whatever else went wrong; they could not see what end the inferior plants and animals answered in the universe, and therefore took no interest in them.

We, however, who have fallen upon better times, should be actuated by no such narrow motives. Our blessed Saviour has taught us that

“not a sparrow falls to the ground without our heavenly Father.” From this we should learn, that what appears to us the meanest and most insignificant part of the creation, is worthy of being looked into, because it is His work; and when we admire His consummate wisdom and goodness in causing the earth to bring forth grass for the service of man, we should not be influenced wholly or principally by selfish motives, but join to our gratitude for benefits conferred on ourselves an acknowledgment of His universal benevolence.

The particular kind of corn which is most important in this country is wheat. Of this there are several varieties, differing from each other more or less in appearance, productiveness, or the season at which they ripen, but still retaining sufficient resemblance to each other to prove that they have been derived from a common stock. It is not known of what country wheat is a native, that is, where it grows wild; but this fact proves to us that it has been cultivated as long as there have existed any records of agriculture; and, indeed, it is most probable that if we were to find the original of the varieties of wheat now cultivated, it would be unlike them all. God has declared, that in the sweat of his face man shall eat bread; it is most probable, therefore, that wheat even in its native country, as an article of food, is not nearly so valuable in its wild state as it is when cultivated, and in those countries in which it is to be considered a foreigner, it quickly degenerates, and becomes comparatively valueless, unless continued labour be bestowed upon its cultivation.

The best modes of cultivating the various kinds of grain are a subject for the consideration of the

farmer rather than of the botanist; but both may discover how little the labour of man would avail unless One wiser and mightier than he interfered in particulars to which human wisdom and power cannot reach. In order that the produce of a country may be in any degree proportionate to the wants of its inhabitants, it is necessary that such produce should be abundant; that is, if corn be cultivated, that a great quantity should grow in a small space. The plants which produce corn, therefore, should be very close together. But, in order that a large number of stems may grow in a small space, it is further necessary that they should be slender, so as not to take up much room, and they ought also to be strong enough to resist the wind and to sustain the weight of the swelling grain, or the husbandman's labour would be expended in vain. We will examine the beautiful contrivances of God's providence, by which all these objects are effected. The ears of corn—(we must attend to these first, for to them all the other parts of the plant are subservient)—are just so far distant from each other that every one has free access to air, rain, and the light of the sun, without shading its neighbour; they are all of nearly an equal height, consequently none are injured by being overtopped by more robust plants, and none liable to be snapped off by sudden gusts of wind, from lifting their heads above the rest of the crop. The stems, unlike those of the greater number of herbaceous plants, are not solid throughout, but consist of hollow tubes, strengthened here and there by stout swelling joints, and the lower part of each tube is encased by the base of a leaf. One might very naturally

suppose that a stem of this description would be more liable to be broken off than a solid one which contained an equal quantity of substance; but it has been found, by experiment, that the reverse of this is the case. If a bar of iron, or any other metal, were to be beaten out and formed into a hollow cylinder, it would sustain a much greater weight, or require a far greater power to be exerted in order to break it, than if it were suffered to remain in its solid state. In like manner, a stem of one year's growth, when its fibres are arranged in a tubular form, will bear a much greater weight of seed, and withstand the violence of the wind very much better, than the same quantity of substance arranged in any other way. The bones of birds afford a similar example of fitness for the particular part they are called on to perform. Many birds easily remain on wing for a very long time without resting, though exercising a power which enables them to fly at the rate of from thirty to sixty miles an hour. In order that they may do this, the bones of their wings must be very light, or the weight would soon bring them to the ground; and it is necessary also that they should at the same time be very strong, otherwise the force of the air pressing against their expanded feathers would snap them off. Accordingly, if we examine the bones in the wing of a bird, we shall find that they are composed of a strong substance as tough as horn, but very thin, and not filled with marrow like the bones of quadrupeds, but hollow, and connected with internal organs, by means of which the bird is enabled to fill the bones with air or to empty them at his will, and accordingly as he may be disposed

to rise or sink. Strength and lightness are thus equally ensured. There is no such reason why the stems of corn should be light, but there is very good reason why they should be strong; and, if we bear in mind that from the smallness of their seeds and roots they are unable to acquire any great substance in one year, we shall readily see why it is necessary for that small quantity to be arranged in such a way as to make the stem as strong as possible. Besides this, I may observe, that there enters into the composition of the outer part of the stems a portion of flint. You wonder, perhaps, that anything so different in its appearance as flint is from straw should be found in the stems of corn, but your wonder will be transferred to another object, when I tell you that it exists in such large quantities in the stems of a certain juicy plant (*horse-tail*) growing in our marshes, that country people use its dried stems to polish vessels of tin and brass.

I doubt whether there is a more beautiful sight in the world than that which is presented by a field of wheat or barley in the month of June. There has been heavy rain during the night; a drop is here and there even yet sparkling on some tufts of grass, and the recently-fallen leaves of the poppy are still crimson and fresh; the wild geranium in the hedge-bank has not yet raised its head, though the scarlet pimpernel, almost a better weather-prophet than the daisy, has opened so widely that I may not fear any more rain to-day; the ground under yonder hawthorn-tree is covered with the white petals which the rain has beaten off. I am rather sorry for this, for I should like to gather a branch, and to bury my

face in its bunches of cool fragrant flowers. Over head, a lark, traced by its song, and only discovered by its twinkling, is rejoicing in the loveliness of the day. There is a fresh breeze astir, and long waves are travelling across the field, which seems as if it would no longer remain in sluggish inactivity, but would wish, like the bee and butterfly skimming on its surface, to start into moving life. Every stem is bending and immediately recovering its former position. There are no broad leaves to offer resistance to the wind, and so ensure destruction to the plants which bear them; but the breeze searches for a way everywhere, and everywhere finds it, supping up or scattering the wet, and rendering the refreshed grain fit to receive the genial rays of the sun.

When you study botany for yourself, you will learn why it is essential to the perfect growth of plants that their leaves should be exposed to the wind, and why the flowers should not be encumbered with excessive moisture; why it is ordained that the bee should ask for nourishment from the flowers of plants, and not from the leaves; and why sun, rain, and wind are all necessary to ensure the ripening of so inconsiderable a thing in the creation as a grain of wheat. For the present, I must content myself with telling you that these things have been thus ordered by Him who has declared that "while the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night shall not cease."

It has been said already, that the various kinds of grass, including wheat, barley, and other sorts of corn, are eminently useful to man, by supplying either him or the domestic animals with food.



THE DARNEL.

There is, however, one exception, and I believe only one. This is the *darnel*,* a rather large grass

* *Lolium temulentum*. Supposed to be the Tare of Scripture.

furnished with broad leaves, a stout stem, and growing as high as wheat, among which it is generally to be found. Instances have been known when the seeds of this plant, which possess peculiarly noxious properties, have accidentally been mixed with wheat, and both being nearly of the same size, it is almost impossible to separate one from the other by the ordinary process of sifting; consequently, whenever this has happened the result has been very serious. Persons who have partaken of bread made from this pernicious mixture, have suffered effects similar to those produced by other active poisons. I have been more especially induced to mention this baneful plant, because it is supposed to be the Tare of Scripture, with the account of which in the parable its character closely agrees. It is evident that the plant there alluded to is possessed of noxious qualities, or it would not have been said that it was sown by an *enemy*; and it is also very likely that it closely resembled wheat, or there would have been no difficulty in discriminating between the two; were the two plants very dissimilar, it might have been rooted up while the corn was young, in the same way that cherlock, and some other weeds, are frequently eradicated from our fields during spring, and early summer. It is very probable, then, that our Saviour, who, in order that he might be better understood by his hearers, was accustomed to illustrate his meaning by referring to objects with which they were familiar, had this plant in view when he compared the end of the world to the harvest, the children of the kingdom being represented by the good seed, the children of the wicked One by

the tares. What renders this the more probable is, that the latter only appeared when the blade of the wheat had sprung up and brought forth fruit. This description exactly agrees with the darnel, the leaves of which are so like the corn among which they grow as not to be distinguished from it until the ear is formed. I was one day walking through a wheat-field in one of the western counties of England, just before harvest, when I observed a considerable quantity of darnel growing among the corn, and stopped to gather some. While I was thus occupied, the owner of the field came up to me, and asked me what I was gathering; I said that I was merely collecting a few specimens of a peculiar kind of grass, which I showed to him. "Ah!" said he, "that is a very bad sort of weed to grow among corn." I assented, and after mentioning to him what the properties of the plant were, said, that "some people supposed it to be the same with the tare of Scripture." The farmer, however, appeared to know very little about the parable to which I alluded, but went on to say, that he found it a very troublesome weed, "for," added he, "I am obliged to employ a number of women, at harvest time, to pick it out from the wheat, and to tie it up in bundles." No doubt, when thus "tied up in bundles," it is usually burnt; for every prudent farmer would adopt such measures as he thought best calculated to prevent it from springing again from seed, which it would most likely do if the straw coming from it were converted into litter; for in this case, although the stems should rot, yet the seeds would be carried out into his fields among manure, and he

would thus perpetuate the evil which he had taken pains to extirpate. This incident, trifling as it was, interested me very much. If it had taken place in Palestine, it would not have been so much to be wondered at, for there the face of nature is but little altered from what it was at the time when our Saviour appeared on earth. There the same plants and animals are still to be found, which are mentioned in the Sacred Writings; and there man himself, prone as he is in other parts of the world to change his habits according to the whim of the day, retains the customs, and even the dress of his forefathers, who lived two thousand years before him. But when in a country like England, so far removed from the scene of the events recorded in the Bible, such an occurrence takes place in the simple course of a country ramble, we are, indeed, led "from nature, up to nature's God." Not only can we see how closely natural religion is connected with the revealed Word of God, but we can learn the same lesson (written in characters of the present day) which is contained in Holy Writ, namely, that the teaching of Christ is for all nations. "Go ye and teach all nations," was Christ's command to his Apostles. They went, and taught; and if we commune with the earth, the earth teaches the same doctrine.

I may here also mention another circumstance connected with this part of my subject, tending to illustrate a passage in Scripture with which you are doubtless familiar; I allude to Pharaoh's dream of the seven ears of corn which came up on one stalk. If you read the account given in the 40th chapter of Genesis you will find that the stalks, both of good

and bad wheat, are said to have borne seven ears. It is not the number, therefore, which is significant of the *productiveness*; the fact that the first



EGYPTIAN WHEAT.*

stalk bare seven ears was not at all emblematical of the abundance of the coming season, otherwise the thin ears, being also seven in number, would

* Grown at St. Mark's College, Chelsea, 1842.

also indicate plenty; but in both cases the number only prefigured the *duration* of abundance or of famine. That seven ears of corn should grow on one stalk, is in this country a thing of most singular occurrence, but in Egypt it was no more unusual than for seven kine to be feeding together in one meadow, for in that country wheat did not grow as it does in England, but generally as many as six or seven ears on a stalk. This was accidentally ascertained only a few years ago, and in a way which, if you were to think as long as you please, you would never find out. It happened thus: The ancient Egyptians were in the habit of embalming their dead; that is, when any one died, they prepared his body in a peculiar way, with spices and herbs, wrapped it very tightly in long bands of linen, and having placed it in a coffin made of very durable wood, deposited the whole in a dry cave or cellar. Dead bodies treated in this manner (mummies as they are called) last for a very long time, as long, perhaps, as three or four thousand years. Many have been brought to Europe, and have excited much curiosity among learned men, because sheets of paper, called *papyri*, containing a history of the person in whose coffin they are enclosed, are frequently found with them; and the coffins also are covered with paintings of the principal occurrences in their lives. It has been thought, that if these writings and paintings could be deciphered, great light would be thrown upon the history of ancient Egypt; so that, whenever a coffin is brought to Europe, the opening of it is looked on as a somewhat important event. A few years ago it was announced that a mummy was to be unrolled at the British Museum, and a

number of persons interested in the subject were present on the occasion. While the operation was going on, a gentleman who was standing by, observed some grains of wheat fall out of the linen folds and picked them up, with the intention of planting them, and seeing whether they still retained the power of vegetation. This he did; one seed grew, soon became a healthy plant, and produced stalks, each of which bore from five to seven heads, exactly answering the description given in the account of Pharaoh's dream. The annexed wood-cut is copied from an ear which grew from seed produced by this very plant.

Now, although we do not exactly *want* such evidence to the truth of the Bible, as is offered by the above anecdotes, yet, to say the least, it is very interesting to be able to examine records of past ages, which nature has had in her own keeping for such immense periods; and it is no less instructive, for we may hence learn that there may be many things in the Bible seemingly strange and unaccountable, only because we have no clue to enable us to enquire into them, and so understand their meaning and application.



EGYPTIAN WHEAT.

There are, indeed, numerous passages in the Bible the meaning of which we can illustrate and render more intelligible by reference to the natural history and customs of Eastern countries. To this class belong Isaiah xxxii. 20: "Blessed are ye that sow beside all waters, that send forth thither the feet of the ox and the ass;" and Eccles. xi. 1, "Cast thy bread upon the waters, for thou shalt find it after many days." In the latter of these passages allusion is made indirectly to the custom, still practised in oriental countries, of sowing rice after a flood on inundated lands, and before the water has subsided; and in the former, to the practice of driving oxen and other domestic animals into the rice lands as soon as the floods have retired, in order that by trampling on the ground they may bury the seed so deeply as to prevent it from being scorched up by the fervent rays of the sun. It is not unusual in this country to drive flocks into corn-fields in the early spring months for a somewhat similar purpose.

Before we quit the corn-field and pass out into yonder shady lane, where, I dare say, we shall find something to look at and talk about, we will gather some of the flowers which make such a show among the corn; and these, with a few honeysuckles and dog-roses, which, without doubt, grow somewhere in our way homewards, will make almost as pretty a nosegay as we could gather in a garden. The farmer will, doubtless, allow us to pull two or three ears of corn, and when we have admired the compactness with which the grains are arranged, and the care which appears to have been taken in protect-

ing them by their chaffy coats, from heat or cold, drought or wet, they shall form the back of our nosegay. One or two bunches of the light feathery grass, which grows on the edge of the pathway, will be a very nice addition.



CORN FLOWERS.

Here are some beautiful sky-blue flowers which we cannot pass by; they are "Corn Pinks," or "Blue Bottles,"* well worth looking at now, on account of their brilliant colour, and equally

* *Centaurea Cyanus*.

worthy of being examined at home for the sake of observing their curious brush-like seeds. Then there are "Corn Cockles,"* with their large rose-coloured petals, and narrow green calyx leaves showing their tips from underneath—"Fumitory,"† with its delicate green leaves, and small flowers, much resembling tubes of pink glass tipped with dark purple—"Wild Scabious," very like a plant that grows in gardens, sometimes called "Mournful Widow," only it has lilac flowers, instead of dark purple—"Pimpernel,"‡ sometimes called "Poor-man's weather-glass," because by shutting its flowers before rain, it tells poor men who have no weather-glasses that it is going to be wet—"Mouse-ear,"§ with its tiny blue flowers, very like the "Forget-me-not,"|| which grows in watery places, only much smaller. We will have nothing to do with those flaunting "Red Poppies,"¶ for besides that they will stain our fingers, they do not smell at all agreeably: but we will complete our bouquet with two or three heads of "White Clover,"** which, though they are not remarkably pretty, will, when it draws towards evening, become so fragrant as to make up for the want of perfume in many of the others. And now, having gathered a handful, let us proceed on our ramble.

* *Agrostemma Githago.*

† *Fumaria capreolata.*

‡ *Anagallis arvensis.*

§ *Myosotis arvensis.*

|| *Myosotis palustris.*

¶ *Papaver Rhæas.*

** *Trifolium repens.*

CHAPTER III.

THE HEDGE-BANK.

To me the meanest flower that blows can give
Thoughts that do often lie too deep for tears.

WORDSWORTH.

VERY early indeed in the spring, before the Crocus has had time to push up its golden flowers through the unfrozen earth of our garden-borders, and before even the Snowdrop has ventured to peep out from the compact flower-sheath in which it has for the last few weeks been wrapped, waiting for its own turn to enliven the face of nature,—while patches of snow are yet to be seen here and there, lurking under hedges and beside haystacks, where the rays of the sun cannot reach them,*—while the redbreast and the wren are the only songsters who have recovered their voices,—while the rivulets still continue to overflow their banks from the effects of melting snow, and broken sheets of ice are still to be seen a little below the surface of ponds,—before nature is quite aroused from her long winter's sleep,—even thus early in the year you will be almost sure to find one cheering harbinger, to hold out the promise of sunny days and genial showers. This is what has been fancifully called the first rose of the year, or Primrose.† I do not mean to say that you will,

* Called, in some parts of the country, "snow-bones."

† *Primula vulgaris*.

at this early season, ever find the hedges as thickly set with primroses as the sky in a winter's night is with stars, (for a spectacle so cheering you must await the arrival of a more genial season,) but, that by dint of vigilant searching, you may discover in some sheltered nook a plant which has thrown out a bunch of genuine spring leaves, enfolding two or three half-expanded primrose buds.



SNOWDROP.

If you can call to your recollection a corner, sheltered from the east and north winds,—(a bank sloping, perhaps, towards the south or south-west,)—where the soil has not been disturbed for a great

number of years, and is principally composed of decayed vegetable substance, there, in the first or second week in January, and sometimes even earlier, you will probably be greeted with a Primrose or two. Should you be thus fortunate, however, you may still have some difficulty in securing your prize; for the chances are that the earliest flowers peep out temptingly from among dry oak-leaves, and brambles yet retaining a few of last year's leaves, (mottled with white and brown veins and spots, and curled at their edges,) and, alas! on the further side of a pond, just deep enough to render crossing it a far from pleasant process. It is a hard matter to refrain from wetting one's feet for such a reward!

A Primrose in January! It is worth a whole handful of Snowdrops. Snowdrops are indeed graceful, lovely flowers; but they come only at their regular season, and though aptly called "first offerings of the year," and "harbingers of spring," they are, as their name implies, associated rather with winter than with spring. But a Primrose! a flower of April, greeting us with its pale though lovely tint, in December or January, dispels for a while the thought of winter, "with all his rising train—vapours, and clouds, and storms," and carries us at once to bright sunny mornings, lengthening days, and light showers, which, if they for a while prevent us from wandering abroad, will make our ramble yet more pleasant when they are at an end. If at any time you wish to gather primroses that you may take them home with you, and keep them in water, do not pluck the flowers only; for, besides that a mass of flowers all of one colour is not nearly so pleasing an

object to the sight as when relieved by other tints, they will retain their freshness for a short time only if they have been gathered one by one. Instead of this, then, break off bunches of leaves and flowers together a little way below the crown of the root, and your flowers will, when they are placed in water, look quite as pretty as they did when growing; they will remain fresh for a very long time, and the unopened buds will expand nearly as well as if they were suffered to remain where nature had placed them. This difference is caused by the absence or presence of leaves; for leaves are not, as many people suppose, merely ornamental to plants, but are absolutely necessary to their perfect development. All animals, you are well aware, must have free access to air, or life will soon become extinct. The atmosphere which we breathe is composed of several gases, one of which (called oxygen) being received through the mouth by inspiration into the lungs, causes an alteration in the appearance and character of the blood, and no animal can remain in a healthy condition unless this process be constantly and regularly carried on. Plants have not, like animals, distinct organs, such as hearts and lungs; but yet a kind of circulation is carried on in their stems and leaves, the latter performing nearly the same office for them that lungs do for animals. The roots draw up nourishment from the earth, which is carried through the stem to the leaves. The surface of the leaf is composed of a very thin transparent skin, (called the cuticle,) perforated with innumerable exceedingly minute pores. Through these air is admitted to the substance of the leaf, upon which carbonic acid gas acts very much in the same

way as oxygen on the lungs. The sap changes its colour from white to green, and after being altered in other respects, is sent back through the leaf-stalk into the main stem, from which it rises again to all parts of the plant.

The reason then why primroses placed in water without leaves soon fade is, that water alone is not their proper food, they require to be supplied with sap, which has been exposed to the action of the atmosphere, and this process can only be performed in the leaves.

In almost every hedge you will find (if you search for it, but not else, for it has few pretensions to beauty,) a little plant, which, though inconspicuous, is very singularly constructed. This is the hairy Bitter Cress.* It sends up tufts of leaves very early in the spring, and, when young, it is by no means despicable as a salad. Its small white flowers are insignificant, and soon fall



BITTER CRESS.

* *Cardamine hirsuta*.

off. When they are gone, long narrow pods grow up in their place, not unlike the seed-pods of the wall-flower, or garden stock. Each of them is composed of three pieces, namely, an expanded membrane, passing through the centre, and two elastic valves, one on each side of the central partition. When the seeds are ripe, which is usually the case so early in the season that few other plants have dared to show even their flowers, the lower part of each valve becomes detached from the stem, curls itself up with astonishing rapidity, and flies off, carrying the seeds with it to a distance of two or three yards, or scattering them in its way. This is one, among very many examples, of skilful contrivance for the dispersion of seeds, of which, as there are some that will probably fall in your way, I shall say a few words. No one who has walked through a wood or shady lane in April can have failed to notice a small, white, bell-shaped flower, beautifully veined with lilac, lurking among delicately green clover-like leaves. It is called "Wood-Sorrel,"* but, perhaps, you may know it by the name of "Rabbit's-meat." The whole plant possesses a grateful acid flavour, and is, it is said, a fair substitute for gooseberries when made into a tart. Some antiquaries maintain that it was this plant from which St. Patrick plucked a leaf when he wished to explain to his disciples the doctrine of the Trinity. The sham-rock, now worn by the Irish on St. Patrick's day, is a kind of trefoil, which grows in meadows; but when St. Patrick preached Christianity in Ireland the greater part of the country was covered with

* *Oxalis Acetosella*.

woods; it is very likely, therefore, that he might at the time have been walking through a woodland country, and, supposing this to have been the case, his attention would be naturally arrested by the "Wood-Sorrel," the leaves of which are, about the middle of March, (when St. Patrick's day falls,) very conspicuous among the dry leaves of the preceding year. It is a lovely little plant, and would be interesting if it had nothing to recommend it but the elegance of its leaves and flowers; but the principal reason I have for mentioning it to you is, that I may direct your attention to it on some hot summer's day, when its flowers have faded, and its leaves grown large and strong. You will then find hidden among the latter an angular seed-vessel, containing several seeds, each of which is enclosed in a tunic of net-work, so elastic that it will, when ripe, split down on one side, and by pressing on the seed project it to the distance of several feet, much in the same way that you may, by pressing an orange-pip between your fingers, shoot it across the room. The first time that I searched for the seeds of the wood-sorrel, to see if the account I had heard of them was correct, I met with a very convincing proof that the plant had the power of scattering its own seeds; for they not only escaped from my hands, leaving their covering behind them, but one of them most unceremoniously skipped into my eye, and caused me no little pain and inconvenience.

If you have ever passed through a furze-brake, on a sunny day in July, you have, I dare say, heard sharp crackling sounds on all sides of you: these are occasioned by the sudden bursting of the pods of the furze,* which are composed of a dry,

* *Ulex Europæus*.

horny substance, and, immediately that they are opened by the heat, suddenly curl themselves into a spiral form, and scatter their seeds to a considerable distance. But for such a contrivance as this, we should rarely be able to find a young furze plant, until the old ones had either decayed or been cut down; for the bushes grow so closely together, and at so short a distance from the ground, that if the seeds fell perpendicularly, many of them would rest in the thick bush, and those that did reach the ground would be entirely deprived of light, while the branches of the old plants would be so thickly matted over them, that, if they took root at all, they would be choked, and would never come to perfection. The providence of God has so ordered, that scarcely any seedling tree will grow under the shade of a larger one of the same kind. It may send up a few leaves, but if not transplanted, rarely thrives; for, after lingering in a very unhealthy condition for a year or two at the most, it dwindles away and dies.

"Whence then," you will ask, "proceed our forests of oak, and beech, and sycamore, and many more trees? How comes it that the hills are concealed from our sight by the variegated tapestry of nature,—our rivers fringed with the foliage of numberless stately trees?" *He* who in the beginning bade the earth bring forth trees yielding fruit after their kind, by his single word allotted them their place in the universe, framed the laws which are to direct and govern their growth, and so harmoniously arranged the whole system of which they are a minute portion, that every apparent defect *is remedied before it is felt*; and not one of the myriads of operations which are constantly going on in nature is at any time imperfect.

To sow a field, to plant a wood, are works for man to accomplish at certain times, and at stated intervals, being distinct works and complete in themselves. But, to speak once for all, and, by a word, to provide that the whole created world shall flourish and be perpetuated for countless ages, this is the work of God, carried out sometimes by humble agency and inconsiderable instruments, but on that account the more certainly the handywork of an Almighty Being.

To illustrate my meaning:—the willow tree is adapted for growing on the banks of rivers, where its quickly formed roots, while they meet with nothing to retard their progress, serve to prevent the river-banks from being washed away. They produce seeds furnished with a light feathery appendage, which, whether the wind blow up the stream, or the current flow down, will be carried by one or the other to some convenient place of growth. If a branch be broken off during a flood, and be carried to a distant spot, wherever it is washed on shore, there it takes root. It needs no planting, for its own weight will bury it deeply enough in the mud in which it is driven,—no watering, for the stream which brought it to the spot where it lies will continue to provide it with moisture; it matters not, even, which end be buried in the earth, for roots will spring from any part which touches the soil.

The seeds of the Ash and Sycamore trees are furnished with light expanded borders, which readily catch the wind, so that when they are blown off, they are usually carried to a considerable distance from the trunk of the tree on which they grow. Neither of these trees casts its seeds as soon as

they are ripe, a circumstance which appears at first to be of very trifling importance, but in effect this peculiarity tends in no slight degree to ensure a nursery of young seedling trees. At the season when these seeds usually ripen, the air for the most part is still; if, therefore, they were to fall spontaneously as soon as matured, they would drop on the ground beneath the tree, under the shade of overhanging branches, and there, in all probability, perish. But being, even when ripe, firmly attached to the branches, they do not fall unless some degree of violence is exerted. In stormy weather, therefore, the wind separates them from the tree, and at the same time blows them to such a distance that great numbers fall in situations where they want nothing but the return of spring to ensure their vegetation. The seed of the Sycamore is also interesting from its being protected by a downy lining of the seed-case from wet and cold, to which it is particularly liable to be exposed while hanging on the tree.

Beeches and Oaks shed their nuts and acorns as soon as they are ripe, that is to say, in weather which is usually calm: winged seeds would, therefore, be of little use to them, and they are not provided with them. Beech-nuts and acorns, then, fall perpendicularly to the ground, where they would remain, probably, till they rotted, had not nature provided other means for disseminating them. They are the favourite food of wood-pigeons and other birds, who, carrying them off and frequently dropping them in their flight, sow them in situations well adapted for their growth. Squirrels and dormice, also, store them away in

their deposits ; and, as they often collect more than they can consume during the winter, the spring converts their barns into a nursery of forest-trees. The seeds of the Dandelion (" clocks," as they are sometimes called,) are too well known to you to need any description. Their curved tapering seeds, their feathery crown, supported on a stalk so slender that you would fancy the slightest breath would at once demolish it ;—there they sail, looking as if they were delighted in the sunshine and breeze, equally with yonder gnats or dragon-flies. Now they rise for a few feet, and are wafted straight in the direction of that clump of beeches, where they will certainly be stopped ; and, if this once happens, they will scarcely be able to set out again on another voyage ; for, though while they are floating in the air they are perfectly safe, let the wind blow as hard as it please, as soon as they touch the ground their sport is at an end, they fall over on their side, the stem which supports their crown is snapped, the seed remains on the ground, the down rises again, and flies about, perhaps, till it is caught in the web of some spider, who soon sets it free again as a very unprofitable visitor, or till some hungry bird snatches at it, and, to his disappointment, finds that it will not supply him with the food which he expected to find ; for this portion has been left behind in some crevice of the ground, where it will next year spring up, and in due time send out a fresh colony of adventurers.

We shall probably find, as we stroll by the wayside, some plants of " Burdock."* These have

* *Arctium Lappa.*

their flowers and seeds collected into heads, called “burs,” which are furnished with numerous hooks,



THE BURDOCK.

serving to attach them so closely to the hair and fleece of animals touching them, that they are carried sometimes for miles away from their native spot. The large seeds of the Hound's-tongue,* which grows in waste places by the sea, are covered with numberless barbed spikes, answering the same purpose. It is impossible

to walk through places where they grow in abundance without having the lower part of your dress covered with them.

Among our hedge-plants, I shall mention every one's favourite, the “Sweet-scented Violet,”† one of the most fragrant of our British flowers. This you know so well, that I scarcely need say anything about it. You may, however, possibly find a difficulty sometimes (especially if the weather be cold, when such flowers lose their fragrance,) in deciding whether your flowers be really Sweet Violets or not. To save you the mortification of gathering a bunch, which you will probably not think worth the trouble of carrying home, I will give you a few hints. Outside the coloured leaves, or *petals*, as they are called, of most flowers, you will find a row of small green leaves, or a single leaf shaped like a cup, called the *calyx*. When

* *Cynoglossum vulgare*.

† *Viola odorata*.

you wish to determine whether your Violets are of the sweet sort or not, examine the calyx leaves : if they taper to a sharp point, the plant is a Dog-Violet ; * if the ends of the calyx leaves are rounded off and blunt, you must take a further look at the root, for there are two kinds whose calyx leaves are thus constructed. Of these, the Sweet Violet is one, and is easily distinguished from the other † by its being furnished with long shoots, which creep along the ground and throw out a few leaves and roots here and there. This character will also help you to distinguish the right sort, if you should wish to transplant some into your garden at the fall of the year. But, plant them in gardens, or greenhouses, or where you will, though you may thus make them blow earlier, or bear double flowers, you will rarely be able to produce a flower which can vie with a genuine hedge-row Violet, either in vigour, beauty, or odour.

“ Oh ! where can Nature, through her wide domains,
Boast other odours half so sweet as thine !
Though the striped tulip, and the blushing rose,
The polyanthus broad with golden eye,
The full carnation, and the lily tall,
Display their beauties in the gay parterre,
In costly gardens, where th’ unlicens’d feet
Of rustics tread not ; yet that lavish hand
Which scatters violets under every thorn,
Forbids that sweets like these should be confined
Within the limits of the rich man’s wall.”

A very singular plant, which is found in great abundance in most parts of the country, is the Arum, ‡ commonly called “Cuckoo-pint,” or “Lords

* *Viola canina*. † *Viola hirta*. ‡ *Arum maculatum*.

and Ladies." I have no doubt that you know it very well, but in case that you should not, I will describe it, in such a way that if you choose to search for it you will not fail to find it, and it will



CUCKOO-PINT.

well reward you for your trouble; for I do not know a more singular plant. Early in May, you may, among brambles and young nettles, find beds of broad shining leaves, occasionally spotted with purple, growing directly from the ground, without

the intervention, I mean, of branches. They are shaped somewhat like the barbs of an arrow at the base, and terminate in a point. From the midst of these rises a long, green, cylindrical bud, shaped somewhat like the handle of a skipping-rope, though scarcely as large. Carefully unroll the leafy sheath which constitutes its outer covering, and you will find that it encloses either a delicate pink or a rich crimson pillar, tapering at the base and rounded at the summit, surrounded underneath by several rows of pink and white beading, the whole being as elegant in form as it is brilliant in colouring. Long before I knew whether this was to be considered as the flower or fruit of the plant, I have amused myself with collecting large numbers of them, and carrying them home with me, for the purpose of unrolling their cases, and sorting them into "Lords and Ladies,"—the former being those brighter in colour and more robust, the latter the more delicate. There is, indeed, no real difference between them, and the amusement was a childish one; but if it was childish it was also innocent, and I think that I can discover in the curiosity which then led me to gather and unroll the buds of the Cuckoo-pint, or in the pleasure which I felt in gathering a hatful of daisies and butter-cups, the desire which I believe to be implanted by God in the hearts of all men, to inquire into and understand something of the works of nature.

All children love flowers; and, if all men and women cultivated the same love of a study, of which, be it remembered, God has taught them the first lesson, they would not only have an innocent and healthy recreation always within their

reach, but they would be engaged in a pursuit which God has sanctioned, and they would daily become acquainted with fresh evidences of His wisdom and goodness.

I am now better acquainted with both the nature and properties of the plant of which I have been speaking; I know the uses of the several parts which compose the column,—what is to be considered the flower, and what will by-and-by become the seed. The column itself, I am told, has, when growing, the peculiar property of evolving heat in quantities so considerable as sensibly to affect a thermometer held near it; and I can conjecture what end in the economy of the plant this property may answer. I know from experience that the fresh juice of the whole plant is so acrid that it will blister the tongue of any one who tastes it; and I can appreciate the reasons which chemists assign for an alteration produced by the agency of heat, which takes away its burning properties, and converts the mealy substance to be found in its roots into food as nutritious as arrow-root; I know the soil which is best adapted for its growth,—where to look for the embryo flower, which is yet enclosed within the leaf-stalk, and before it has risen above the ground;* I can assign a reason for the roots remaining asleep and inactive during several months each year, and I can name the seasons when

* Early in January, the buds of the Cuckoo-pint may be discovered forcing their tender points through the frozen ground. Carefully remove the earth from the neighbourhood of one of these, and sever it from the root as low down as you conveniently can. Then, with a sharp penknife, slit up the white juicy stem, to the depth of about a third of its diameter,

they contain more nutritive matter than at any other.

This knowledge (for knowledge it is, little though it be,) I have attained by fostering the desire, implanted in me by the God of nature, of searching into the things of nature. It is very *different*, I am well aware, from the knowledge of God, but *compatible* with it, and, if duly directed, calculated to promote it; for I cannot believe that He who taught me to search would inculcate a lesson tending to any thing but what was for my good. Even now I never pass a spring without unfolding the buds of "Cockoo-pint," as I did when a child; not, perhaps, with the same desire of satisfying my curiosity, but impressed with an equal degree of admiration of God's wisdom, and with feelings of deep thankfulness for His goodness. "Speak to the earth and it shall teach thee," is a precept He conveyed into my mind before I could read; and now that I can read and understand, I am thankful that this precept was but the stepping-stone to another, "Lift up your eyes on high, and behold who hath created these things."

While speaking about the Cuckoo-pint, I mentioned a plant yet more common, which, though not so remarkable in the eye of the casual observer, is perhaps still more worthy of the examination of the curious. This is the Nettle.* "Oh!

and you will find imbedded in the folds of the young leaves a perfectly formed but exceedingly minute sheath, furnished with its own proper stem, and containing all the organs belonging to the mature plant. The operation requires some care, as all the parts are very brittle.

* *Urtica dioica*.

those nasty nettles!" I think I hear you say; "what can there be interesting about them?" Rough, unsightly-looking plants as they are, no less than three of the most beautiful of our English butterflies, when in their larva or caterpillar state, prefer their leaves to any other food. These are the Peacock, and Smaller Tortoise-shell Butterflies, which you may see, in bright summer weather, flitting about like "winged flowers," or occasionally alighting on some tall thistle, from the long tubular flowers of which they sip up honey with their flexible trunks; and the Atalanta, or Red Admiral, whose favourite food, while he wears his more showy dress, is the honey which exudes from ivy blossoms: on this he regales himself as long as it lasts, that is, to the very close of autumn; and when the rains of winter have set in, hides himself in some sheltered corner, but, as if anxious to enjoy every hour of sunshine during his "little year," takes an airing every fine day, till the frosts of Christmas banish him from the scene altogether.

Nettle-leaves afford a dainty repast to many other insects besides these, while in their larva state, and not to insects only. When boiled and chopped small, they afford a nutritious and inexpensive food for young ducks, who devour it greedily: and young nettle-tops are *said*, like the young shoots of the hop, to be a very cheap and good substitute for Asparagus. This may be the case, though I am somewhat inclined to doubt it; but the full-grown stems, if treated like Hemp, may be applied to purposes very useful to man, for they may be converted into a serviceable kind of twine. These uses of the Nettle have never

before probably come under your notice. With one of its properties I dare say you are much better acquainted, for it is a knowledge which is generally acquired in a way no less strange than easy, namely, by the touch. You have doubtless discovered that nettles have the power of stinging any one who meddles with them. If you will run the risk of suffering a little pain for the sake of gaining a little knowledge, grasp a leaf boldly and firmly, and gather it. It is covered, you will see, with a countless multitude of small spikes, terminating in exquisitely fine points. Each of these rises from a swoln base, which contains in it a drop of fluid, so acrid, that when received into the circulation it irritates and inflames the part affected, so as to cause considerable inconvenience, which lasts sometimes for several hours. The mechanism by which this process is carried on is most wonderful, and on this account the nettle is what I have stated it to be, an object well worthy of the examination of the curious. Each little spike, though so slender as to be no more than barely visible to the naked eye, is a hollow tube performing a two-fold office; first, that of piercing the skin, and next, that of conducting the poison from the swoln part of the base into the flesh of the person who touches it; for what appears to be a point is in reality the open end of the tube. The spike itself is rigid, while the case of poison is soft, yielding to the slightest pressure. When you touch the leaf with your hand gently, the spike pierces the skin and buries itself to the base, so that the surface of the skin presses on the bag of poison, some of which is forced up through the tube and conveyed into the wound, where it instantly mixes with the

blood, and causes the sensation of stinging, which you find so annoying.

The construction of the sting in the bee and wasp is precisely similar, the bag of poison being concealed within the body of the insect, except when it chooses to make use of its small but formidable weapon, when it is placed in such a position as to be pressed on by the surface which is wounded. The dangerous fang of the viper, and the deadly one of the rattle-snake, differ only in one respect: being stouter than the stings of the bee and nettle, if they were hollow at the end, they would be too blunt to make a wound readily; the tube, therefore, terminates at the side of the fang, at a short distance below its summit, the part above being solid. By this contrivance the point is strong and sharp, while the poison is as effectually introduced into a wound through the side of the weapon as if it proceeded from the end. The reason why the hand is not stung when the leaf of the nettle is grasped boldly is, that all the spikes are crushed and broken without piercing the skin.

Thus you see that the nettle, despicable as it is in appearance, is furnished with an apparatus which may with truth be called wonderful. So minute, yet so exquisitely contrived! so simple, yet so perfect! A wise Creator must indeed have been engaged here! And the plant itself, seemingly so vile and worthless, yet armed at all points with myriads of cunningly-wrought poisoned spears, which wound our hands on the slightest touch, and yet are browsed upon by quadrupeds, not only without injury to their tender lips, but, perhaps, affecting them pleasantly! Whence does the poison come? How is it that it is so differ-

ent in its nature from the juice found in the rest of the plant? By what process was it separated, and who directed that process? This last question is the only one that I can answer. He who points the lightning—He who governs the world—Who has fixed in their stations, and directs in their courses, the countless hosts of heaven—even He, the Almighty and beneficent Creator, condescends to display His skill in the construction of so inconsiderable a thing as the sting of a nettle. How watchful must He then be over the only one of His works which He created to be immortal! How wise to create, how mighty to destroy, and (happy reflection for us) how willing to save!

One of the most striking marks of God's goodness is, that He has placed us in a world, crowded on every side with objects to the full knowledge of which, strive as much as we may, we can never attain. This seems, perhaps, a strange assertion, but you will, I think, on reflection, agree with me. He has told us in His word, that man is the first of created beings, the first, I mean, in importance; for to man was given dominion over all animals, and to him and the inferior animals God gave every herb and every tree for food. We have every right to believe, therefore, that He takes a very active interest in our welfare. Now we might be, perhaps, (and indeed I fear too many of us are,) so much engrossed with the desire of pleasing ourselves as to lose sight of this protecting care of our Heavenly Father, if no objects presented themselves to our notice but such as man makes, of which we can fully understand the construction and uses.

But as it is, if we rest our eye on what is to us the most valueless thing in the creation (the sting of a nettle for instance) we are lost at once in wonder and amazement. We cannot conceive how it grew, in what its peculiar property consists, or what end it answers. The only point on which we can satisfy ourselves is, that God is its Creator, and that He exercises a miraculous care in bringing it to perfection, and watching over it. Hence we learn two most important lessons, two of the principal, indeed, which are contained in Holy Writ. First, "that our knowledge is not derived from ourselves, or we should be able to extend it as far as we pleased; therefore, it must have been given to us by Himself; and if we are dependent on Him for the best of His temporal gifts, we are dependent upon Him for all; and if for all our temporal gifts, yet more so for all our spiritual privileges; whatever, therefore, we now possess, or shall enjoy hereafter, is the gift of God." This lesson our ignorance teaches us. Secondly, we know enough to see that "none but an Almighty power could have created the most trifling objects around us, and yet that these apparently trifling objects are watched over and protected, and brought to perfection, with as much carefulness as if they occupied the important station in the universe which has been assigned to ourselves. Hence we may infer not merely that an equal care is extended over us, while we are fulfilling our mission on earth, but that, as He made us partakers of an immortal nature, His interest in our welfare extends to all eternity; and so, that far from having pleasure in the death of him that dieth, he would have us to accept the terms of

the Gospel of Jesus Christ, and also to be 'made perfect.' The care which He extends to the meanest of created things, He surely does not withhold from the noblest; if He brings to perfection the grass of the field, how much more shall He make perfect him, whom He created in His own image!"

Time will not serve me to describe to you a half of the pretty plants which you may at one season or another meet with, in the course of a ramble through one of the pleasant green lanes with which England, more than any other country, abounds. I will, therefore, only mention the names of a few which you may look out for, and we will seek in yonder wood shelter from the shower, which I apprehend is coming on.

Early in May, about the same time that the Cuckoo-pint appears, the "Germander Speedwell"* is very conspicuous with its bright blue flowers, growing generally on banks which are tolerably clear of brambles. The flowers will probably drop off as soon as they are gathered, and the stem droop very soon after; but if placed in water it will quickly revive, and the unopened buds will expand in a room nearly as well as in their native place, only the flowers will be somewhat smaller, and not so dark in colour. The "Large Stitchwort,"† you will, I dare say, find growing near it, and flowering about the same time. It has long wiry stems with leaves like grass, and star-shaped flowers of a dazzling white, shining like satin. I have sometimes, indeed, heard it called "Satin flower." The "Night-shade," or

* *Veronica Chamædrys.*

† *Stellaria holostea.*

"Bitter sweet,"* appears later in the season, bearing bunches of drooping purple and yellow flowers, shaped like those of the potatoe, and



scarlet berries. This is sometimes called "Deadly Nightshade,"† but erroneously; the latter plant being very different, both in appearance and properties. It is much less common than the Nightshade, and is generally found about old quarries and ruins, bearing large dark green leaves, bell-shaped flowers of a lurid purple hue, and black berries nearly as large as a cherry, which it somewhat resembles, except that its base is surround-

NIGHT-SHADE, OR BITTER SWEET.

ed by a green leaf. The berry contains a deadly poison, and the whole plant is, I believe, no less poisonous. Its juice, when rubbed on the

* *Solanum Dulcamara*.

† *Atropa Belladonna*.

eyelid, has the remarkable property of dilating the iris, so as to increase the size of the pupil, and is on that account found useful in operations on the eye. You will probably find also two species of *Potentilla*,* which have large, bright, and very beautiful yellow flowers, rising but a short distance from the ground. One of them, called "Cinquefoil," has, as its name implies, five leaves growing from a common stem; the other, called "Silver weed," is remarkable for having leaves which are thickly invested with a covering like white floss silk. The "Fox-glove,"† the stateliest of all our English herbaceous plants, needs no description; its name, according to some people, is derived from "Folksgloves," Folk being a name for the fairies. The last that I shall mention is the "Gromwell,"‡ or "Grey Millet." I



FOX-GLOVE.

* *P. reptans*, and *P. anserina*. † *Digitalis purpurea*.

‡ *Lithospermum officinale*.

know not how to describe it, so as to enable you to find it when it is in flower ; but if you should ever chance to light upon a plant, with straight stems, about two feet high, rough leaves, and bearing seeds one-sixth of the size of a pea, of a bluish grey colour, and with a surface as smooth as enamel, you have found my plant. The seeds are very singular ; so exactly resembling small sea-shells, that I have seen people take up a box of them, look at them, and lay them down again, with a full conviction that the objects of their curiosity had spent their lives in the bottom of the sea, instead of having ripened among leaves and flowers. About a twentieth part of the shell of each seed is pure flint ; hence we need not be surprised at its hardness and exquisite polish.



CHAPTER IV.

THE WOOD.



Beneath the verdurous canopy, how sweet
To muse awhile, weaving delicious thought
In Fancy's fairy loom !

H. I. J.

IN thus taking refuge from the rain under the shelter of a tree, like this noble oak which overshadows us, there is a pleasure which I can neither describe nor account for. The air is perfectly still, and, to judge from the increased and constant pattering of the drops on the broad overhanging leaves, the rain is falling very smartly. But the blackbird and the woodlark mind it as little as we do; they are chanting away merrily enough. Not an insect is to be seen; fly, bee, and butterfly, have all been guided by an instinct that never deceives them, to take refuge in some place of security. A few gnats only are performing a fantastic dance in the air, being possessed, it would seem, of the power of eluding the drops.

Nature is apparently as much refreshed with the cool sprinkling which she is undergoing, as we should be with a sea-breeze on a sultry day in July. We cannot yet venture forth from our hiding-place, but we may, even here, find something to amuse, and probably to instruct us.

The ground in the immediate vicinity of the

tree is, you observe, perfectly dry. Half-an-hour's hard rain would scarcely penetrate the thick shade which shelters us, and moisten the soil about its trunk. You would fancy, then, that in summer, when trees are furnished with leaves, and when they most need moisture, they have it least in their power to obtain it. This is not at all the case, for the leaves, as I have before told you, are able to absorb moisture in great quantities, not only from actual rain, but from the air; and if you do but think what a very large surface they present to the atmosphere, you will readily see that the quantity of nourishment which a tree loses by having its roots sheltered from wet, is more than compensated by the absorbing power of its leaves. Wonderful to say too, the drops that after a long-continued rain do reach the ground in the immediate neighbourhood of the trunk, do not at all tend to its support. They penetrate into the ground and are lost, or, if the ground be warm, soon evaporate, but are not supped up by the rootlets; and for this very good reason; Providence has not placed any roots having the power of absorbing moisture, where they could not be constantly employed. At a short distance from us, where you see by the motion of the grass and dead leaves lying on the ground, that rain is falling, if you were to dig to a slight depth beneath the surface, you would find the roots divided into an infinite number of small fibres. These are the roots which supply the tree with nourishment, and they all terminate either immediately under the branches from which the drops fall most abundantly, or just beyond them, where the ground is fully exposed to the rain. It is a general rule that the roots of a tree ex-

tend at least to an equal distance from the trunk under ground that the branches do above.

You know, I dare say, that it is a very difficult thing to make a large tree grow, after having been transplanted. Now, what is the reason of this? Old trees, you may think, like old people, are attached to places where they have spent their early years; they are accustomed to a certain soil, and have not vigour enough to acquire new habits. This is very romantic and pretty, but I doubt much whether it be true. At all events, I can give you a reason, which, if it be not poetical, is at least so far satisfactory that it is founded on facts. When an attempt is made at transplanting a tree which has attained a considerable size, no great difficulty is encountered in removing the large roots; they are strong and tough, and will stand a great deal of rough treatment; but when you come to the delicate fibrous roots, which alone supply the tree with nourishment, they are so intertangled with each other, they have so firm a hold on the earth, and are withal so fragile, that although you may succeed in removing the tree, you leave behind that which should supply it with food, and consequently, when replanted, it is starved to death before it can send out new roots. To prove that this is the reason, I may mention an experiment, which has been repeatedly tried with great success. It is desired to transplant a large tree from a wood to an ornamental piece of ground in a park, or garden. Instead of attempting the impossible task of saving unhurt the fibrous roots, which extend to a great distance on all sides, the plan adopted is, to dig a tolerably deep trench round the trunk, at the dis-

tance of a few feet from it, cutting quite through every large root that presents itself. The consequence is, that the tree, no longer nourished by its remote rootlets, is checked in its growth, and immediately provides itself with a remedy. To supply the loss, it sends out from the parts that remain, new rootlets, all of which are of necessity very close together, and if likely to become entangled with each other and the surrounding earth, so much the better. After having been allowed to stand in this state for a year or two, it is undermined, and may be removed to any distance, bearing with it the newly-formed rootlets undisturbed; for they are enclosed in a mass of soil, which is carried with them, protecting them from injury during the removal, and supplying them with nourishment until the tree is become permanently fixed in its new habitation, when they increase in size, and in time supply the place of the great roots which are left behind.

I have said that, as a general rule, the roots of a tree stretch as far from the trunk under ground as the branches do above. If this be the case, it will follow that trees, such as you frequently see standing alone in a field or lawn, which are not very lofty, but extend their branches far and wide, are furnished with equally spreading roots. You can recollect, I am sure, some favourite tree, the branches of which reached to a great distance from the bole or main stem, and so low that you could easily climb into them, and find a comfortable shady seat. Now, if you will take the trouble to recollect the spot where this grew, you will remember either that it was in a field, or that there was at least an open space in the direction in which

the long arms extended. On the other hand, if you go into a wood, the trees in which are planted very close together, you will not find any with horizontal branches. The trunks rise quite erect; probably they do not divide into branches till they have reached a considerable height; or, if they do, the stems are nearly perpendicular. But examine the trees on the skirt of the same wood; and although they be of the same kind, and grow in the same soil as those in the centre, they are less lofty, but invariably spread towards the open space. Here we see another wonderfully wise provision of Nature. The tree which stands in the middle of a field is exposed to the action of the wind, from whichever quarter it blows. It does not therefore rise very high, or the wind blowing against its leafy summit would exercise on it a force similar to that of the human hand acting on one end of a long lever (a crow-bar for instance), and soon overthrow it. It is true, it presents a very large surface to the action of the wind, but the force exercised against it is counterbalanced by the thickness of the stem (for unprotected trees always have the stoutest trunks), and by the very strong hold which its thick and spreading roots have on the ground. Trees growing on the skirt of a wood have also low branches and spreading roots on the exposed side, while the inner branches are more lofty and approach nearer to the perpendicular, their roots extending but to a short distance when their support is little needed. Those which grow in the central parts of a wood, being protected by their neighbours from the violence of storms, do not require spreading roots to strengthen them, and therefore send their

roots downwards in search of the nourishment which, on account of their being sheltered from rain, they could not find near the surface. If, as it sometimes happens, a very violent storm uproots the trees growing on the verge of a wood, the consequences are as disastrous to those in the interior as they would be to a besieged city, of which the walls had been battered down. They are snapped off or uprooted on all sides, encountering an assailant against whom they were not prepared. The same results are to be apprehended when the woodman imprudently cuts down the timber which skirts a forest. This, I may remark, is rarely done; for that which naturally serves as a protection to a wood, is of the least use to man, from its being short, while that which grows in the interior is much more serviceable, from its length and straightness.

Rain, besides performing the important office of supplying leaves with nourishment, keeps them in a healthy state by washing them. Leaves, as I have before hinted, are copiously furnished with pores, through which they both inhale and exhale. These pores are exceedingly small, and would, in all probability, become choked by dust and the work of insects, if the surface of the leaf were not occasionally cleansed, a process which is most effectually performed by the sprinkling of rain. The air which we breathe, and that inhaled by plants, though proceeding from the same source, are very different in kind. That which is alone calculated to support animal life is called oxygen, and is one of the constituent parts of the atmosphere which surrounds us. Every time we take breath we receive a portion of it into our frames,

when a part mixes with the blood, which it renders fit for circulation, and the remainder uniting with carbon, a substance which we swallow in most kinds of food, becomes carbonic acid gas, a kind of air which is destructive of animal life.* Carbonic acid gas, then, which is composed of two ingredients, oxygen gas and carbon, is as necessary to support the life of plants, as oxygen is of animals. It is received through the pores into the leaves of plants, where it is separated into its two constituent parts; the carbon is retained in the leaf, and is deposited in the form of wood; the oxygen is given out, and, mixing with the air, purifies and fits it for the respiration of animals. In this wonderful way do the animal and vegetable worlds prepare sustenance for each other. Man and the inferior animals never cease exhaling a gas which goes to form the substance of vegetables; and the latter, while they are in an active state of existence, that is, while there is light, are constantly emitting a gas, of which if a due supply were to fail, the whole animal world would cease to exist.

Pick up one of the withered leaves, many kinds of which lie at your feet; it is to all appearance dead; it has fulfilled the office for which it was created, and is now utterly useless :

* Carbon enters largely into the composition of most inflammable substances. Charcoal is pure carbon; coal is carbon mixed with sulphur and another gas called hydrogen. When carbon mixes with oxygen chemically, heat is the result; sometimes this heat is intense, when combustion takes place, as when a fire is lighted; at other times, heat is evolved in a less degree, as when we breathe, and, in the latter case, animal heat is produced. The heat observed in the Arum (see page 44) and some other plants, proceeds probably from a combination of oxygen and carbon.

no matter how soon the wind may sweep it away, or the cottager add it to the heap on his hearth, for the loss of a single leaf can be a matter of no importance. But, however insignificant it may be in itself, no leaf *is* lost: if blown away by the wind, it will be lodged probably in some corner where it will soon crumble into dust; if burnt, its ashes will be carried out, and help to fertilize the cottager's garden. As a leaf, it is no longer of any value; and God has prepared a minute and an unobtrusive agent, which will speedily reduce it to such a state that it may again perform an office assigned to it by Himself. You will observe that it is spotted with a few black or brown marks, somewhat roundish in appearance, but of no well-defined form. Each of these is a perfect plant, very simple indeed, but produced from seed, growing, and producing seed in its turn. It derives its nourishment from the substance of the leaf, which it thus secretly converts into a fine mould fit for the reception of the seeds of any larger plants which may happen to be deposited in it. It belongs to a tribe of vegetables not well-known, but most important in the economy of nature; not growing in soil adapted for the production of other plants, but fixing themselves on all kinds of vegetable substance which have attained maturity, or have ceased to live, deriving sustenance from them, and crumbling into dust, that they may in their turn afford a resting-place for new forms of vegetable life. They are called *Fungi*, and are not unfrequently termed a destructive tribe of plants, a character which, indeed, they seem well to merit; but it must be remembered, that they prey, in most

cases, on substances which, having performed the work for which they were created, have ceased to be of any use, and that their principal office is to convert dead wood and leaves into rich layers of mould, fit for the growth of future woods and forests. Some of them are so minute that you require a powerful microscope to discover their form; others attain to a very large size. To the latter class belong the strange-looking protuberances on the stump of yonder decaying Ash-tree. If you examine them closely, you will find that, in their general appearance, they somewhat resemble the valves of oyster-shells: the upper surface is tough and horny, sometimes variegated with beautiful colours arranged in concentric circles; the under side is perforated with numberless pores, like sponge. This species is often found of large dimensions, sometimes measuring as much as six or seven feet in circumference, and weighing twenty or thirty pounds. Another kind has been known to grow, in a single night, from the size of a mere point to that of a huge Gourd. Its substance is composed of minute cells, which must have multiplied at the rate of 4,000,000,000 in an hour, or of more than sixty-six millions in a minute. Some species are with greater propriety called destructive; these, under the name of Dry Rot, find their way into the timber of houses and ships, which in time they utterly destroy. Some are good for food, as the *Mushroom* and *Champignon*. Among these are some which grow underneath the ground; they are called *Truffles* and *Morels*, and, in countries where they are abundant, are hunted by pigs and dogs, trained to discover them

by the scent. Several species are found in meadows growing in circles. Fairy rings are caused by the luxuriance of the grass in ground rendered productive by the decay of Fungi, which originally grew in the centre, and gradually extended in a circular manner, adding their decomposed substance to the soil. One species is found only on the bodies of dead flies; another comes to maturity only on the inside of grains of wheat, when it is called *Rust*; another is very frequently sent to table (and in this case you may perhaps swallow some hundreds of plants at a mouthful without being aware of it) in the form of mould of cheese.

These vegetables, though the principal, are not the only agents employed in converting fallen leaves and dead wood into a substance adapted to the reproduction of plants. Many kinds of snails and other small land-shells find among the faded honours of the forest both shelter and food; numbers of minute beetles also assist, and innumerable other insects are everywhere busily employed in the same work; so that you can scarcely take up a particle of decayed vegetable matter without discovering in it evidences of the presence of active life, supported not merely on its own account, but having a definite object assigned to it, which, though not readily apprehended by the uninquiring mind, (especially when considered as a single existence,) is, when collectively estimated, of vast importance in preserving the balance of nature. The very mould which attaches itself to the dried specimens in your herbarium, and the troublesome little beetle which perforates the cabinet containing them, are instruments appointed by Providence for the restoration of ma-

tured vegetable substance to a form which will enable them to afford sustenance to new varieties of vegetable life, and, through their instrumentality, to new forms of animal existence. Such objects, on account of their minuteness and seeming insignificance, are often little noted; but, when they are closely and patiently scrutinized, attest the wisdom and design of Omnipotence as distinctly as the most highly developed and most complicately constructed organ of the noblest work in the creation. None but a Mighty Being could create and govern the solar system; but to effect so important an end as the maintenance of animal and vegetable life by the humble agency of insects and Fungi, scarcely cognizable to our senses,—this would seem to require, if possible, a superior Intelligence—a Mind that not only can contrive and execute a great work, but can do all this with the simplest machinery—a Being not only *most* powerful but *all* powerful. And most merciful also must be that Being, Who manifests to us His omnipotence in an atom of the Creation barely visible to the human eye, Whose beneficence is no less visible in the blade of grass on which we tread, than in the glorious luminary whose quickening influence awakens it into life. The famous Sicilian philosopher, Archimedes, is said to have conceived in his mind a machine sufficiently powerful to move the world; but no one, as far as I am aware, ever devised a scheme of fertilizing a single square foot of ground, without calling in, directly or indirectly, the aid of agents whose interference he could neither destroy nor check.

Plants which depend upon other organized bodies for their support are called Parasites; they grow either on decaying substances, like those which I have

mentioned, or attach themselves to living plants, and indeed, in a few instances, to living animals. Of the latter the most remarkable is a species of Fungus,* which is found in New Zealand, grow-



ing from the head of a large caterpillar. Little is known about the mode of its growth in this strange situation, but it must be rapid ; for by the time that it has arrived at maturity, it occupies the whole substance of the animal, the figure of which is preserved entire. Those which grow on living plants are much more numerous, comprising a large portion of the many-coloured and beautiful Lichens which spot the trunks and branches of trees, a great number of Mosses, and several Ferns. None of these however, actually insert their roots into the substance of the wood on which they grow. The Lichens and Mosses can scarcely be said to possess roots ; the little threads which proceed from their lower extremities seem only to attach them to the bark ; and the Ferns, while they cling closely to the rugged stems which support them, depend principally for their nourishment upon the Mosses

among which they grow, and the decayed vegetable substance scattered among them. Some plants, however, really live upon the juices of the trees from which they spring. Among these, one of the most remarkable is the Mistletoe, so famous in olden times with our forefathers. On

* *Spharia Robertsii*.

the first day of the year it was gathered by the Druids with peculiar solemnities; it was cut with a golden hook by the chief Druid, and caught in a pure white cloth, and, after being consecrated to the most powerful of their gods, was distributed among the people as a remedy against all diseases. In times much later it was thought to possess extraordinary virtues: the possession of it, for instance, was necessary in order that a man might be made a magician; any one, by holding a branch in his hand, would be enabled not only to see ghosts, but to force them to speak to him. In the feudal days it was gathered with great solemnity on Christmas-eve, and hung up in the great hall with loud shouts and rejoicing.

“ The damsel donned her kirtle sheen,
The hall was dressed with holly green,
Forth to the woods did merry men go,
To gather in the misseltoe.
Then open wide the baron’s hall,
To vassal, tenant, serf, and all.”

But these imaginary virtues are now no longer attributed to it, even although it may appear to the many, on account of its peculiar mode of growth, a plant of mystery. This is still as wonderful as ever. The white berries, which are a very conspicuous part of the plant, are composed of an exceedingly viscid substance enclosing seeds, and are the favourite food of the thrush, blackbird, and especially the missel-thrush. These birds, after regaling on the berries, fly to other trees, carrying with them seeds attached by the clammy substance to their beaks. After alighting, they rub them against the bark, just as you may have seen canaries cleaning their bills on their perches,

and so transfer the seeds from themselves to the trees. They adhere, by the means of the viscid substance enveloping them, till the season of germination ; when there appears, rising through the covering of the seed, a kind of rootlet which bends down till it reaches the bark ; it then swells out like the extremity of the sucker of a house-fly, and finally buries itself in the bark of the tree. Leaves soon appear at the opposite extremity ; the roots in the mean time having penetrated the bark, and extending themselves between it and the soft wood. New wood is formed by the tree overlying the roots of the parasite, which thus become embedded in its substance, and occasionally send up suckers at some distance from the place where the seed was deposited, much in the same way that common trees multiply themselves. The Mistletoe is by no means a harmless visitor to the tree in which it takes root ; for, by robbing the branch of its sap, it weakens and sometimes destroys it. Hence, when it makes its appearance in orchards, it is generally eradicated by careful farmers before it has attained any considerable size. It grows more frequently on the Apple than on any other tree, but is sometimes found on the Poplar, Lime, &c. It is most rare on the Oak ; and it was, when found a parasite on this " Lord of the woods," that it was held in such great veneration by the Druids. You will find no difficulty in making the seeds grow, if you rub the ripe berries against the smooth bark of an Apple-tree in the winter, or early in the spring. But take care that you do not sow too extensively, unless the trees are your own ; for, however anxious you may be to satisfy your curiosity, you will receive but poor thanks

from the owner of the orchard into which you introduce your troublesome visitor. Valuable as our forefathers deemed it, it will now yield, in exchange for the nourishment which it withdraws from his trees, nothing but a few sorry berries, useful for no purpose but that of being converted into bird-lime.

One of our very common plants may be termed a half-parasite, namely, the Ivy. It inserts its principal roots into the ground, and extends its branches as you must have many times observed, along the surface of anything near it, such as walls, rocks, and trunks of trees. If you attempt to separate one of these young climbing stems from the substance over which it grows, you will see that it adheres very closely by means of numerous fibres, springing from the innermost side of the shoot. If the substance to which it clings be soft, and capable of affording the plant nourishment, these fibres become proper roots; this you may prove by cutting the stem asunder, beneath the point of union, when the upper portion will continue to flourish as before. If, however, the surface to which they adhere be hard, the fibres become dilated at the extremity, and seem only to bind the plant to its supporter. The smoother the surface is, the wider is the dilated disk, which seems to know, as it were instinctively, that a slender point could not attach itself to any but a rugged substance. The Ivy, when young, has not much to boast of on the score of beauty, except upon close examination; and then its glossy green, or pink leaves, with their meandering white veins intersecting each other in every direction, are very pretty. Sometimes (this is particularly ob-

servable in woods) it creeps along the ground, which it completely hides from the sight, forming a tangled mat of shining dark leaves. Thus situated, it sends out none of the fibres described above; but numerous roots penetrating everywhere into the soil are found throughout the whole of its length, and in every instance originate, we may say, a new plant. It has therefore no need of flowers, or seeds, and accordingly never produces any, as long as it wears this character. Ivy berries are found only on branches which grow entirely without support; and such branches bear neither roots nor tendrils, either of which, if produced on a part of the plant which shoots freely into the air, would be superfluous: the former could not shoot into the ground, and there is no occasion that they should do so, for seeds here ripen in abundance; the latter could cling to nothing for support, and they need none, for here the branches are strong enough to support themselves.

The world perhaps cannot exhibit a more pleasing sight than that afforded by a mass of bushy ivy mantling a village church in some sequestered part of our happy country. In summer and in winter, under the bright glare of day and when twilight has invested its deep green with a more sombre hue, it is always the same, and always beautiful,—an apt emblem of the unchangeable God, around whose temple it has grown. Scarcely less interesting is it when it has closely invested the trunk of some venerable giant of the forest, now no longer able to boast of much verdure of its own, liberally giving ornament in exchange for support.

Hast thou seen, in winter's stormiest day,
The trunk of a blighted oak,
Not dead, but sinking in slow decay
Beneath Time's resistless stroke ;
Round which a luxuriant ivy had grown,
And wreathed it with verdure no longer its own ?

Perchance thou hast seen this sight, and then,
As I at thy years might do,
Passed carelessly by, nor turned again
That scathed wreck to view.
But now I can draw from that perishing tree
Thoughts which are soothing and dear to me.

Oh ! smile not, nor think it a worthless thing
If it be with instruction fraught ;
That which will closest and longest cling
Is alone worth a serious thought !
Should aught be unlovely which thus can shed
Grace on the dying, and leaves on the dead ?

BERNARD BARTON.

I have occasionally seen a large number of moderately-sized trees so closely invested with the luxuriant foliage of this plant as to present in mid-winter the appearance of a vineyard ; but, it must be owned, I fear, that, greatly as trees are indebted for their beautiful appearance to ivy, their growth is much impeded by it. Not that there is anything actually deleterious in its shade, as some suppose, or that, according to others, its fibres penetrate the bark of trees, and exhaust their juices ; but, when it creeps and winds round the trunks of the trees which support it, the ivy-bands form a sort of net-work, and prevent them from increasing in diameter. When this has taken place, no room is left for the passage of the sap, and the tree dwindles away, and sometimes dies in consequence. Care, however, should be taken, in

removing the inhospitable visitor, that the tree be not stripped of its clothing all at once, lest it should be killed by a sudden exposure to cold, from which it had been previously screened.

And now that the rain has passed away, and the sun is shining with a splendour which seems to be redoubled, owing to his rays being reflected from the wet leaves, we will sally forth from our hiding-place, and continue our ramble. The first thing we meet with worthy of remark is the peculiar odour which floats in the air; an odour only observable in woods which are either damp from their situation, or have been moistened by rain. This proceeds in great measure from decaying vegetable substance, and from Mosses generally, but more particularly from some plants belonging to a genus called *Jungermannia*. These, when moistened, emit an odour which, though few persons would class it among perfumes, is, from its association with woods and streams, most delicious. Few of the plants belonging to this genus attain the size of three or four inches; several are so minute, that a magnifying glass is required to ascertain even their outlines. The most fragrant,

(I use a word to which, unless you love with all your heart every thing that the country produces, you will probably object,) and one of the commonest,* rarely exceeds an inch and a half in length. It grows on



JUNGERMANNIA RESUPINATA.

* *Jungermannia resupinata*.

moist banks, among Moss and other small plants, and will elude your search, probably, until you have acquired a good knowledge of most of the larger plants. I am inclined to think that few but botanists have ever seen it, and of them those only who have turned their attention to the more minute plants. The botanist takes note not merely of trees and shrubs, and plants with conspicuous flowers, but examines the structure of the smallest vegetable that grows, well content, if he cannot discover its use and the end for which it is created, to contemplate it as an atom attesting God's omnipotence.

From the summit of a stem barely an inch in length, but bearing from twenty to thirty perfect leaves, which, under the microscope, resemble the most exquisite lace-work, runs a delicate white thread, clear as glass, and so fragile that the slightest touch will destroy it. On the summit of this is a shining black globe, not half the size of a pin's head, but containing, notwithstanding, some hundreds, perhaps I might say several thousands, of perfect organized bodies. During wet weather it retains this globular form; but, after a short exposure to a dry atmosphere, and especially to the direct rays of the sun, it opens with four valves, the partitions of which reach from its summit to its base, and discloses a mass of ripe seeds ready to be sown and to spring up into new plants. With them are intermixed a vast number of infinitely minute threads, thicker in the middle than at the extremities, and containing within them a spiral vessel, which as soon as the thread is exposed to the dry air, or the rays of the sun, suddenly contracts, and by its motion scatters the seeds with

which it is in contact in all directions. Should you never have an opportunity of examining the plant, you may form a pretty good notion of the manner in which it acts, by twisting a thin slip of India-rubber and burying it under poppy seeds, or some such small bodies. The elastic nature of the India-rubber will enable it to recover its shape, in doing which it will scatter the seeds in all directions. But as there are many species of *Jungermannia*, and nearly all of them grow in similar situations,—that is to say, in moist shady places,—you will scarcely fail, if you search in April or May, to find one or other of them. Place one of the seed-vessels under a microscope in the sun, and you will soon see the valves open, and the seeds flying away in all directions. If you have no microscope, I would recommend you to procure what is called a Stanhope lens,* which you will find a never-failing source of amusement and instruction in your *Botanical Rambles*. Crush one of the seed-vessels, and having moistened with the tongue the least convex side of the lens, attach the bruised mass to the glass, and examine it. It will seem at first to be nothing but a confused assemblage of dark-coloured seeds: but watch it closely, and you will discern, that, as the moisture

* The Stanhope lens is a small cylinder of solid glass, enclosed in a case of silver, or some other metal, and having its two extremities of different degrees of convexity, and consequently two foci situated at unequal distances from the surface of the lens. When the most convex side is turned towards the eye, the focus falls exactly on the opposite surface, to which the object to be examined should be *attached*. If turned from the eye, the focus is situated at about the eighth of an inch from the same side, at which distance the object should be *held*.

evaporates, the little threads (*elaters*, as they are called, from their elasticity,) will set themselves in motion, and very soon disperse the seeds, so that none are left on the glass, with the exception of a few, which were placed out of their reach.

It would almost seem that nature has been more solicitous to ensure the propagation of such inconsiderable plants as that which I have described, than of more stately vegetable productions. Not only are they furnished with innumerable seeds, but the seeds themselves are protected and disseminated by various contrivances, all of which are most wonderful; and, added to this, they are so light that they float about in the air, and are capable of becoming plants, on almost every substance on which they alight. Walk where you will, over heath, hill, or wood, you will scarcely be able once to set your foot on the ground without treading on some species of Moss: you may, perhaps, cover with the palm of your hand some hundreds of perfect plants, each of which shall be furnished with roots, leaves, stem, and seed-vessels, and every seed-vessel shall contain a countless number of seeds, so minute as to be singly invisible to the naked eye.

From thirty to forty different kinds of Moss grow, probably, within two or three yards of the spot on which we are standing. Of these, some have long straggling stems, which take root wherever they touch the ground; others are growing in tufts on the rugged barks of neighbouring trees; some you will find springing from the perpendicular sides of banks, or crowded in dense masses at the edges of streams. Different from each other, as all are, in shape, mode of growth,

and locality, they all agree in these respects—they are very tenacious of life, and exceedingly prolific, in most cases producing abundance of seeds, or, when they fail to do this, increasing rapidly by means of their creeping stems. Their seed-vessels are very singular, and, though minute, are very complex in their structure. From amongst a set of leaves, differing in shape from the rest, rises a stem no thicker than a horse-hair, and extremely tough, which, during the early stages of its growth, tapers to a point. Soon the upper part begins to swell, when it is found to be enclosed in a case, shaped somewhat like a hood, either expanding as the seed-vessel enlarges, or splitting down on one side. As the seed-vessel approaches to maturity the hood falls off, and within is discovered a beautifully polished, urn-shaped vessel, either standing erect on the summit of the stem, curved more or less, or quite pendulous. It has its mouth closed with a lid, which, when the seeds ripen, also falls off, and exposes, in most cases, a single or double row of threads, flattened at the base and tapering upwards, which appear to be a continuation of the lining of the seed-vessel. These threads, or “teeth,” as they are called, are always of the same number in the same species of Moss, being either 4, 8, 16, 32, or 64. They are highly sensitive, altering their position at every change of weather. During wet weather they lie flat on the mouth of the seed-vessel, and lock into one another in such a way as to prevent a particle of moisture from reaching the seeds. As soon, however, as the air becomes dry, they rise and stand erect, or bend backwards over the outside of the seed-vessel, allowing the seeds, which are so minute as to be wafted away

by the lightest breath of air, to escape at a time when they are likely to meet with nothing which can impede their aerial journey. Frequently, when examining a ripe seed-vessel under the microscope, I have observed the fringe of teeth arise and fall, so as to keep exact time with my breathing. This *hygrometric* property (or power of indicating the presence or absence of moisture) sometimes exists in the stalk which supports the seed-vessel. A remarkable example of this occurs in a Moss which is perhaps one of the most generally diffused plants in the world, growing in almost all climates and situations.* In moist weather its *seta* (the name given to the stalk of the seed-vessel) is straight; but, when the air is dry, it curls up to such a degree, that its extremity touches the ground, and the seed-vessel buries itself among the leaves. It is found most abundantly on the tops of walls, in fields where ashes have been thrown, or in green-houses, or the earth contained in garden-pots. It is called *Funaria hygrometrica*; the former name being derived from a Latin word signifying a rope, from the twisted form which it sometimes assumes; the latter from its hygrometric properties.

I shall probably have something more to say about Mosses on another occasion; we will not stop, therefore, to examine them any further at present, but will hasten into the open country, for the sun is now shining out with such fervour that we shall soon be able to ramble over the adjoining heath without wetting our feet. But, before we say adieu to our shelter, I must point

* *Funaria hygrometrica*.

out to you a few objects which, if we had time, would be well worthy of notice. First, look at this Bramble leaf, which bears a light-coloured mark, as if a little stream had meandered over it. If you have never before been told the cause of this, you will be interested in hearing it, for it affords a remarkable example of that wonderful instinct with which God endues even the smallest of his creatures. A little fly deposits its egg between the upper and under skins of the leaf; and, when the young caterpillar is hatched, it moves along still between the two skins, feeding upon the substance of the leaf, and carefully turning back when it arrives at the edge, so as never to break the walls of its house. The insect eats more and more in proportion to its growth; hence the traces of its journey gradually widen, until at last they come to a sudden stop. Here the little devourer undergoes a transformation, being converted into what is called a pupa, or chrysalis, that is to say, having arrived at a stage of its existence when it neither moves nor eats, but is enclosed in a case, and is to all appearance lifeless. After remaining in this state for a time, it becomes a fly, and, having again acquired the power of motion, liberates itself from its hitherto secluded dwelling.

Look again at the little green ball attached to the under side of this Oak leaf! It is the habitation of an insect which spends here a large portion of its existence. And what a miserable existence! you will perhaps say. To be for half of its life confined within the limits of a single leaf, without companions, and without the power of moving to another place! What can be more wretched? I

will tell you. It is far more miserable to have the power of going whither you will, and of doing what you will, and yet to be discontented. From the paltry insect which has eaten out for itself a dwelling-place in a Bramble leaf, and spent the greater part of its existence within the compass of a single



BRAMBLE LEAF.

square inch, you may learn something worth recollecting,—to be content with what God has given you, and to do your duty in whatever station you may be placed :—

To be resigned when ills betide,
Patient when favours are denied,
Content with favours given ;—
That this indeed is virtue's part,
This is that incense of the heart
Whose fragrance smells to Heaven.

COTTON.

The insignificant worm, you may think, who spends his life enclosed in a Bramble leaf or confined within a hollow ball, where he must be insensible even to the change produced by the alternation of day and night, envies the lark that he hears high above his head, singing his happy songs as he sports in the sunshine. Far from it ;— all are equally fulfilling the purpose for which they were created, and therefore all are equally happy, however varied and dissimilar may be their respective enjoyments. They feel no wants which they cannot immediately satisfy ; and desires they have none, for their knowledge is bounded by the walls of their prison-house.

How beautifully the drops of rain hanging about the heads of yonder grass-like plant sparkle in the sunshine ! You might fancy the plant to be studded with diamonds. They are scarcely less brilliant by moonlight, when the drops of dew, suspended on the points of the flowers, might be almost mistaken for glow-worms. It is a species of Wood-rush ; but, from its sparkling appearance, has been termed "Glow-worm Grass," or *Luciola*, which is the Italian name for a glow-worm.

The little plant springing up in such abundance under the trees around us, with shining rough-

edged leaves inserted in rings round the stem, is the Sweet-scented Wood-ruff.* It is sometimes called Wood-rowel, its whorl of leaves resembling the rowel of a spur. The name was formerly spelt,

Double U, double O, double D, E ;
R, O, double U, double F, E.

It bears a pretty little white flower in April or May, but is more remarkable for the sweet smell that its leaves emit when dry, resembling new hay or the Tonca bean. If you wish to preserve a specimen for your herbarium, you must dry a whole plant; but, if you want it only for the sake of its odour, the best way of preserving it is to cut through the stem immediately above and below a knot, when you will have about eight leaves arranged in a circular manner and lying quite flat. Place these in a book, and in the course of a day or two you will find that they have acquired a delicious odour, which will last till the following year at least. Every spring I place one inside the paper of my watch-case, and it always retains its fragrance till the season comes round again.

One of our stateliest woodland plants is the "Male Fern," growing most luxuriantly in damp hollows, and sending out numerous tall and graceful fronds, arranged in a circle round the root, drooping like feathers, or presenting an outline which reminds us of some beautiful Grecian vase. Its neighbour, the elegant "Lady Fern," is yet more graceful, though inferior in its stately mode of growth. The former has the lower part of its

* *Asperula odorata*.

stem copiously clothed with brown shaggy scales ; hence in its young state, when its leaves are curled up and concealed by the stem, it might almost be mistaken for a large hairy caterpillar. The stem of the Lady Fern is green and almost smooth, and its leaves are cut into innumerable divisions, as fine as lace-work. None of the Fern tribe possess organs that can be correctly termed flowers, though they produce seeds in the greatest profusion. Examine the back of the leaf, and you will be at no loss to discover where they grow. On the Male Fern you will observe rows of small circular scales covering a vast number of minute brown bodies. Each of these is an orbicular seed-vessel, encircled by an elastic jointed ring, dividing it into two hemispheres. When the included seeds have arrived at maturity, the ring bursts spontaneously and allows the seeds to escape. The latter are so minute as to be invisible to the naked eye, unless there be great numbers of them together. Shake a full-grown frond on a sheet of white paper, and they will make themselves sufficiently evident. The seed-vessels of the Lady Fern are arranged like those of the other, on the back of the leaf, but in short dark lines. The fructification is most conspicuous in a Fern called "Polypody," which grows very abundantly on old hedges, about the decaying roots of trees. Its frond is not cut into numerous segments like the two which I have mentioned, but is only once divided. Down each of the divisions of the upper half of the frond run two parallel rows of orange-coloured dots composed of a great number of seed-vessels, which have no scaly covering as the others have, but are furnished each with a stalk of

its own, and, when ripe, burst and discharge their seeds by the agency of the elastic ring described above. The "Hart's-tongue Fern" (so called from its shape) differs from all of these in not being divided at all, and having its seeds arranged in long lines on the back of the frond. The "Royal Fern," or "Flowering Fern," grows in bushy places near the water, and sometimes attains the height of six or seven feet. It bears its fructification on the summit of the plant, in masses of a beautiful golden colour, which in this respect resembling a crown, have, I suppose, given the plant its kingly name.

"My thoughts are feasting by the woodland shade,
The rugged pathlet, and the bright cascade,
Where the tall Foxglove peeps into the brook,
And *Royal Ferns* adorn each watery nook ;
Where Cinquefoil studs the earth with stars of gold,
While, from its dwelling by the Violet cold,
With laughing eyes, the coy Forget-me-not
Bids me not heedless pass the hallowed spot."

I will only detain you while we examine one object more, and we will continue our walk. Yonder tree bearing such beautiful large leaves is a Plane. It is remarkable for the smoothness of its bark, which, instead of splitting and so becoming rugged, like the bole of the Oak or the Elm, as its diameter increases, annually falls off, and exposes the newly formed rind unmarked by a single crack. But the leaf, I think, is more worthy of note than the stem. You will observe that its stalk is much swollen at the base, being there as thick as the twig which supports it. Carefully detach it, and you will discover that it is hollow, and encloses a green bud, which remains behind after the leaf has been

removed. The use of the hollow stem is to shelter the young bud during the colds of autumn. But, when the leaf has fallen off, the bud is not left



STEM AND BUD OF THE PLANE-TREE.

without protection, for it is enveloped in a tough case lined with a kind of resin which is impenetrable to wet: within this is a similar case lined externally with the same coating; next come a number of scales covered with a dense coat of brown

fur, which must serve as an admirable safeguard against cold; and within all lie the leaves wrapped



LEAF OF PLANE-TREE.

up in a mantle of silk, waiting till the succeeding spring shall give them new vigour and enable them to burst all their envelopes.

CHAPTER V.

THE HEATH.

FAIR Morn ascends ; fresh Zephyr's breath
 Blows liberal o'er yon bloomy heath,
 Where, sown profusely, herb and flower,
 Of balmy smell, of healing power,
 Their souls in fragrant dews exhale,
 And breathe fresh life in ev'ry gale.
 Here spreads a green expanse of plains,
 Where, sweetly pensive, Silence reigns ;
 And there, at utmost stretch of eye,
 A mountain fades into the sky ;
 While winding round, diffused and deep,
 A river rolls with sounding sweep ;
 Of human heart no traces near,
 I seem alone with Nature here.
 Oh ! thou most courted, most despised,
 And but in absence duly prized,
 These are thy walks, oh, sacred Health !
 The monarch's bliss, the beggar's wealth ;
 The seasoning of all good below,
 The sovereign friend in joy or woe.

MALLET.

HERE we are on the open heath, with nothing
 interposed between us and the clear blue sky above
 and around us ; the fresh breeze laden with
 health sweeping by, and carrying away with it all
 our fears lest our long walk should over-fatigue us,
 all recollection that our ramble must terminate
 with the setting sun.

This is a place where it is indeed a luxury to

spend an hour in idleness, to lie down upon the matted heath and moss, and give one's self up to whatever thoughts may arise; and it is a place, I think, where a well-trained mind could scarcely fix on an unprofitable subject for meditation. Every object within sight, whether animate or otherwise, seems as if no mortal eye had lighted on it since it came from the hands of its Creator; and hence He appears to be here more indubitably present than elsewhere.

This cannot be so in reality, for if God were not with us at all times, and in all places, we could not continue to exist: but yet it can do no harm to think so; rather the contrary, and for this reason, that, if the impression be brought home closely to our minds on one occasion, it may serve to keep alive a perpetual sense of His omnipresence.

I would now wish to draw your attention more particularly to the process by which a wild heath, like this on which we are standing, may in course of time be converted into a flourishing wood, such as that which we have just quitted.

There was a time, probably, when the stunted vegetation which now surrounds us was wanting; when even the thin layer of mould, affording it a frugal but sufficient supply of nourishment, was also absent. As far as the eye could reach, extended a plain of barren gravel, unrelieved by anything save the rugged head of some time-battered rock. Now, however, widely is the scene changed! Scarcely a spot can be discovered which is not thickly invested with a matting of heath, furze, grass, and moss, while the bare surface of a rock is to be seen only at wide intervals. Be not too

sure, however, till you have closely inspected the rock, that the surface ~~is~~ bare; for it would be scarcely less strange that the flint-stone should have its parasites than the interior of a grain of wheat. And in fact, rugged and hard as the face of the rock appears, and indeed is, you will scarcely be able to touch a spot where there is not, between the substance of the rock and your hand, a living and flourishing vegetable. Yes, even on the polished surface of flints, plants will grow and spread. I do not say that their roots will penetrate the rock, but perfect plants will spring up, and ripen their seeds where there is not the minutest particle of earth. Examine the face of this mass of granite, which is composed of crystals of felspar and quartz (two substances hard enough to scratch glass), with a few scales of mica scattered here and there. On one part of its surface you will observe a number of irregularly arranged oblong black spots,* which are dry, and so hard as to be in all appearance a part of the stone itself. In reality they are organized living bodies, which have sprung from seed lodged here by the wind, and contain within them the embryo of numerous other plants, in fact, like the poppy-head or bean-pod, mature seed-vessels. Adjoining these, is an irregularly shaped patch of greenish yellow substance which you will in vain attempt to remove with your knife.† Beautifully traversed as it is with meandering veins, and dark spots, resembling the rivers and towns in a map, it is so thin that you will find it impossible to secure a specimen, unless you can detach a portion of the rock to which it adheres. Close by it grows (for

* *Opegrapha saxatilis*.

† *Lecidea geographica*.

this too is a living plant) a rough grey substance,* thickly studded with light-coloured circular disks, having raised borders, not unlike small stemless mushrooms. The plants which I am describing are called Lichens; and, although many of them are minute, and to a careless observer insignificant, they are, as we shall see by-and-by, of very great importance in the economy of Nature.



MAP LICHEN.

These, and a vast number of others, agree in having a rough surface, and in being so intimately attached to the rock as to be practically inseparable from it without breaking one or the other. Scattered over the same pile of rocks, you will find others, resembling those described, in being fastened to the bare rock without the aid of roots; but differing in these respects, that their substance is thicker, and that they are not attached by the whole of their under surface, but curl upwards at the extremity. One you will find in great abundance

* *Lecanora Parella*.

of a bright orange colour; another, equally abundant, or perhaps more so, is of a beautiful sulphur colour; a third of an ashy grey, traversed by whitish lines; another of a dark olive, &c. &c.*



CRAB'S EYE LICHEN.

The rock in fact, if it be not so productive of stately plants as the hedge-bank, or corn-field, is quite as diversified as to colour, and has at least this advantage, that in summer and winter it is always the same; here is neither fading of flowers, nor shedding of leaves. Now direct your attention to the foot of the rock, especially to that part of it which does not descend perpendicularly into the ground, but slopes gradually to its base. Here you will find several species of Moss, closely

* These belong to the genus *Parmelia*.

resembling those which we found in the wood, and, mixed with them, several other kinds of Lichen, some of which are like those already described, others very different. Here, for instance, is one which might almost be mistaken for a tattered portion of a kid glove.* Its upper surface is of a dull lead-colour, and underneath it is white and furnished with numerous tendrils of the same colour, attaching it to the ground. It bears its fructification at the extremity, in largish buff-coloured spots, somewhat resembling the human nail. Close by this, is a grey tangled mass, of copiously branched vegetable substance, which, if we had picked it up on the sea-shore, you would certainly have pronounced to be coral.† It bears its fructification sparingly, on the summit of the stem, in the form of little globes, which eventually split vertically, and suffer the seeds to escape. Here is another little plant, peeping up through the moss and heath, and beautifully contrasting its wiry white stems with the rich green and brown of the surrounding herbage; this too is a Lichen, though generally called Rein-deer Moss, about which I shall have something to say by-and-by.‡ Here, on the horizontal surface of the rock, where a thin layer of mould has been deposited, is a cluster of rough mealy little columns, each of which bears either a funnel-shaped cup, edged with the most brilliant crimson, or a small round mass of the same conspicuous colour.§ Scarcely anything with which I am acquainted either in nature or art, presents, as to colour, so dazzling an appearance as a large mass of these plants when

* *Peltidea canina*.

‡ *Cladonia rangiferina*.

† *Sphaerophoron coralloides*.

§ *Scyphophorus cocciferus*.

the sun shines on them after a shower. More brilliant than the brightest coral, and reflecting light from their polished summits, one might imagine them to be gems, cut and set by the hand of Nature, to give a grace to the rugged rock, or



REIN-DEER MOSS.

the dark mould from which they spring. In common with the other kinds of Lichen, and the Mosses generally, they will bear exposure to excessive drought, for an indefinite period of time, without materially altering in appearance. A very fine specimen, which I gathered four years ago, is as beautiful as it ever was; and, if restored to its

native soil, it would probably continue to vegetate as if it had never been removed.

But it is time that I should tell you in what way these humble plants serve as instruments in the hand of Providence for converting rocky districts into fertile pastures and woodlands. Their substance is composed entirely of an assemblage of minute cells, which have the power of absorbing moisture, either from the direct application of water to the plant or from the atmosphere, and this power they possess in a high degree and exercise very readily. Examine the side of a rock against which the rain has been beating, and you will find every moss and lichen fresh and flourishing. Immediately that the water touched them, they supped in, as it were, as much as they could hold, and distributed it throughout their whole extent; just as a piece of sugar will distribute fluid throughout all its substance, although one extremity only be immersed. Go round to the other side of the rock, which has been sheltered from the wet, and you will find them all to be so dry, that, when you attempt to pluck them, they will break, or even crumble in your hand. Dip any one of them in water, and it will immediately recover its elasticity; straightening its branches, or expanding its leaves under your very eye. Or you may choose one of the driest, which to all appearance is dead, and place it in a close case among other plants, and, although the latter be not actually wet, it will absorb so much of the moisture which evaporates from them, as to recover in a very short time its most vigorous condition.

Possessing this facility of taking in nourish-

ment through their leaves and stems, the mosses and lichens, and especially the latter, have no need of roots, properly so called; all that they require, is, to be attached to the rock so firmly as to be able to resist the action of the wind, which in exposed places like those in which they grow, is at times very violent. And firmly attached they are indeed; for although you may readily remove a *part* of a plant from the rock, you will find it a far easier task to detach a portion of the rock from the mass, than to separate from it the extremity of the stem. Having then no means for deriving nourishment from the substance on which they grow, and growing on a substance which can afford them none,—situated in localities which are exposed to the direct rays of the sun, and the immediate action of the wind,—if like most other plants, they could not live without the constant presence of moisture, the first week of hot summer weather, or of a dry east wind, would terminate their existence, and the whole tribe not having time to mature their seeds, would perish. Thus we see, that their constitution is such as eminently suits them for growing in places where no other vegetable would live.

And now as to their utility. Those which appear first in order of time, are the hard thin lichens which I first described. Their rough surface arrests and retains the seeds of the larger kinds lodged on them by the wind. These germinate; and while, during their term of existence, they in like manner arrest the particles of dust which may be brought by the wind, they eventually decay, and afford in their mouldering substance a suitable resting-place for the seeds of grasses,

and other small plants. These also spring up, and although there are many which do not arrive at perfection, but wither for lack of moisture before they have attained any considerable size, they fail not to perform the office which they were sent there to fulfil; their early decay making a speedy addition to the layer of mould from which they originated. By this time the larger creeping mosses have grown up, and execute the double office of sheltering the ground from the rays of the sun, and of conducting moisture through their cellular substance from one part of it to another. By this process a pleasant green turf is speedily formed; various new kinds of plants spring up, and are matured: their intermatting roots firmly bind the soil together while they live, and as soon as they die crumble into dust, adding to it a fresh stratum of earth, which is now become fit for the reception of the seeds of larger plants. Thus a regular succession of different forms of vegetable life goes on, from the scarcely perceptible lichen, the humble creeping moss, the annual grass, the tufted herb, the bushy shrub, to the stately oak or pine. This process man assists by clearing away and burning bushes of furze, or heath, adding their ashes to the soil; and subsequently by ploughing, sowing, and planting; or he retards it by paring off the turf, as soon as it has attained sufficient thickness, and carrying it away for fuel.

Of the Reindeer Moss, to which I have alluded before, a very interesting description is to be found in "Linnæus's Flora Lapponica," which I will translate for you.

"Throughout the whole of Lapland no vegeta-

ble is more abundant than this *Cladonia*. Sandy or gravelly plains of two or three miles in extent, and sparingly sprinkled here and there with pines, may be seen covered white as snow with this lichen. When a forest has been consumed by lightning, no vegetable for a long period can find sustenance among the ashes, until at length the Reindeer Moss (as it is called) springs up, and in a very few years arrives at perfection. These plains covered with lichen, which a stranger would call an accursed land, are fertile pastures to the Laplander, who, in possession of a tract of such country, esteems himself a prosperous man. The Laplander, rejecting agriculture to which neither soil nor climate are favourable, pursues the pastoral life of the patriarch, as being much better adapted to his necessities. The Reindeer are his cattle and his flocks; if they prosper, he prospers. To these animals, naturally impatient of heat, an all-wise Creator has allotted the most northerly regions, such as Lapland and Greenland; but even here He has not failed to make adequate provision for their sustenance. In summer they desert the warm valleys, and seek the confines of perpetual snow, whither their owners attend and watch them. At the approach of winter, both are compelled to descend from these Alpine heights, the former for want of the herbage which had constituted their food during the warm months, the latter from the severity of the cold. It is during the long and cheerless winter that the Reindeer Moss is appreciated. It is then the principal food of the reindeer, whose sagacity is such, that, however deeply the ground may be covered with snow, he is at no loss to discover his

favourite food, and not only derives sufficient aliment from this sapless lichen, but even fattens upon it. The herdsman, therefore, has no need to build houses, in which his herds may be stalled during winter, and in summer is equally exempt from the necessity of cutting, saving, and husbanding his hay."

In another place the same author says, "The reindeer sometimes suffers great hardships in autumn when the snow happens to have all melted away during summer, and a sudden frost freezes the Mountain Lichen, which is his only winter food. When this fails, the animal has no other resource, for he never touches hay." A calamity of this kind, however, occurs as rarely as a famine in England; for the winter there is almost always ushered in by falls of snow, which, being a bad conductor of heat, prevents the warmth of the earth from being dissipated by radiation. How admirably in this case has Providence adapted the animal and its native country to each other. A cold, bleak district, sheltered but here and there by a few fir trees, and scantily furnished even with grass, Lapland would seem to be "a land to which inhabitants are denied:" but it is, nevertheless, plentifully stocked with animals belonging to a tribe whose subsistence, in other climates, consists chiefly of herbs that in Lapland are nowhere to be found in sufficient abundance to constitute an article of food. But, unproductive of grass though it be, it abounds in a vegetable which in other regions is of little value, and rarely attains any considerable size. In this cold climate, however, it grows luxuriantly, and is spread in such profusion over the plains, that it affords a

plentiful supply to almost the only animal that can endure the cold. So hardy is the Reindeer Moss, that neither snow nor frost injures it; but, since the latter would render it so rigid as to prevent the animal from browsing on it, the Providence that placed it there has provided a mantle for its protection, a covering of snow, which, while it shelters the plant, is very easily removed by the feet of the deer, who is instructed by an unerring instinct both where to look for its food, and how to obtain it. "These wait all upon thee, that thou mayest give them their meat in due season. That thou givest them they gather. Thou openest thine hand, they are filled with good."

There is a kind of moss* which abounds on exposed heaths and mountains, and is also very serviceable to the Laplander, though of far less importance than the Reindeer Moss. It is of a dark green colour, and resembles a juniper branch, or the twig of a fir-tree, only very much smaller. When it grows in boggy places it often attains such a size that it may be made into brooms. It bears its seed-vessel on a long, erect and bare stalk, and is surmounted by a brownish cap, composed of matted hair. Linnæus says of this, "The Laplanders cut out a surface of this, as large as they please, for a bed, separating it from the earth beneath; and although the shoots are scarcely branched, they nevertheless are so entangled by the roots as not to be separable from each other. This mossy cushion is very soft and elastic, not growing hard by pressure; and, if a similar portion of it be made to serve as a coverlet, nothing

* *Polytrichum commune.*

can be more warm and comfortable. They fold their bed together, tying it up into a roll that may be grasped by a man's arms, which, if necessary, they carry with them to the place where they mean to sleep the night following. If it becomes too dry and compressed, its former elasticity is restored by a little moisture."

You have, I dare say, often stopped under a clump of fir-trees, and listened with pleasure to the wind murmuring through the long wiry leaves, and sounding like the roar of the distant sea; but did you ever form a conjecture as to the reason why the leaves should be so different in form from those of most other trees? Now, if you look at the stunted shrubs around us, and think of them in connection with the fir-tree, you will soon discover that this peculiar structure was not given without design.

First, we have two or three different sorts of heath, all of which, besides having very tough roots, are furnished with branches, which, though slight, are so flexible that, by yielding to the blast, they escape uninjured, let the storm rage ever so violently. The leaves are equally well adapted to the sort of place in which the heath flourishes; they are small, very little flattened, and extremely rigid; in consequence of which the wind passes through the bush without either tearing or scattering them. Perhaps you may find a few junipers here and there; but they, as well as the heath, have leaves so constructed as to offer no resistance to the wind, and on this rely for their safety. The Furze, which is thickly beset with rigid sharp-pointed prickles in place of leaves, upon which the strongest wind can take no

effect, is equally secure. The very grass here appears to wear a different character from that under which it appears in the meadows, being tufted and bristly, instead of having long wide leaves. The few flowering plants beside these seem afraid to rise far from the ground, lest they should be injured by the driving wind. They

mostly seek shelter behind bushes and rocks, and only in such situations attain anything like luxuriance. If any overtop the heath and furze, you will find that they are well prepared to stand exposure to the weather. These tall grasses, for instance, will *bend* to the blast, but will not *break*. So elastic are their stems, that the tops of them may be bent till they touch the ground, and immediately that they are released they will recover their erect position. The Harebell, or round-leaved Campanula,* frequently overtops the heath and furze



HAREBELL.

* *Campanula rotundifolia*. This seems a strange name to give to a plant, the leaves of which are nearly all long and narrow: it is, however, quite appropriate, for in the spring all the root-leaves are round, but these very soon wither.

with its blue bell-shaped flowers; but, owing to the wiry elasticity of its stem, it may be bowed by the wind to the ground, but not broken.

Now, the various kinds of pine and larch grow in exposed mountainous situations, where there is nearly always a breeze astir, and very frequently a heavy gale; but they preserve their foliage safe during the most violent storm; for their leaves, though rigid, are so narrow, that they offer little resistance to the wind, which, as it passes through them, causes the murmuring sound almost always to be heard, in a greater or less degree, in their vicinity.

It has often struck me, when I have been walking through a wood or park early in spring,—so early I mean, that although the leaves of the trees are almost fully expanded, the storms of winter have scarcely ceased,—it has often occurred to me, when I have seen a few leaves torn off and driven before me by the unseasonable blast, that, if God were pleased to send the storms of winter at another season, late in spring, for instance, or at midsummer, most of the woods and forests in England would be in a few weeks laid prostrate. If the trees were to put forth their leaves in the winter, the result would be the same; and even supposing that they escaped this untimely fate, they would be quickly stripped of all their green honours. According to the present harmonious arrangement, which He in His wisdom has seen fit to institute, the stormiest seasons are

Linnæus, it is said, gave this name to it, from having observed it early in the season, (when its leaves only make it conspicuous,) growing on the steps leading to his lecture-room, in the University of Upsal.

those of winter and early spring, when most trees are bare, and the wind finds an easy passage through the naked boughs. The few trees that retain their leaves during this period, such as the box, yew, laurel, laurestinus, &c., (most of which, by the by, are foreigners,) seldom attain a height which renders them liable to be uprooted by the wind, and their stout leathery leaves are well able to withstand every wind that may blow.* If the substance of their leaves resembled that of the elm or oak-leaves, they would soon be torn to pieces or scattered. Another season when we frequently experience stormy weather, is late in autumn; but the leaves have then fulfilled their office, and are so loosely attached to the tree, that they do not at all endanger its safety, but part from their support immediately on being assailed.

You will not find many showy flowers here, though Heath and Furze, when in perfection, well merit that title. Of the former plant, there are three very common species; two more grow in Cornwall, and three others in Ireland. The most common in England is the "purple" or "fine-leaved Heath," which may be distinguished by its numerous drooping flowers, covering a considerable portion of the stem, and, like the leaves, of a sufficiently strong texture to withstand the force of the most boisterous wind. The flowers will rustle when a bunch is gathered, as if they were perfectly dry. A beautiful species, which prefers a boggy soil, is the cross-leaved heath, well marked by its delicate pink and rather large flowers collected into a head at the summit of the stem.

* The Fir-tree must, of course, be excepted; but upon its wiry leaves the wind, I have said, has no effect.

The third species is nearly as abundant as the first. It has small pink flowers, divided into four deep segments, in which particular it differs from all the other species. Properly speaking, it is not a heath at all, but belongs to another genus, *Calluna* or *Ling*. It resembles the other species, however, so closely in its general appearance, mode of growth, locality, &c., that it is as frequently called by one name as the other. In Scotland it is commonly called "heather," a word which also includes the other common species. Its foliage is more beautiful than that of either of the kinds, resembling *chenille*. The heaths are all troublesome plants to dry for botanical purposes; for after they have been a few days in paper the leaves fall off, a circumstance which is accounted for on the supposition, that the stem retains the vital principle for a long time, and throws off the dead leaves as it would if it were still growing. Most probably this is the case, for if the whole plant be immersed in boiling water before it is put to dry, and thus killed, none of the leaves will fall off.

Of the Furze we have two species. One of these sometimes attains a height of eight or ten feet; I recollect, indeed, to have seen one at Carclew, in Cornwall, so high that when I was on horseback I could scarcely reach its top with my cane. This species has large pale yellow flowers, which appear in spring, and convert the bush (at other times so unsightly) into a blaze of gold.

" ——— The hardy Furze,
In yellow lustre glows, a sea of gold,
Teeming with potent fragrance more intense
When in unclouded majesty the sun
Walks his meridian path."

A smaller species, which is frequently confounded with the other, has fewer and less conspicuous flowers, and makes a shewy appearance at the same season that the heath blooms, with the purple bells of which it mingles its rich yellow or almost orange-coloured flowers, each enhancing the beauty of its companion. The two kinds may easily be distinguished by examining the flower, at the base of which the dwarf sort has two very minute brownish scales closely pressed to the calyx; the former also has two scales at its base, but larger, and placed at some little distance from it.

Furze-bushes are frequently rendered conspicuous by tangled masses of a very singular plant called Dodder.* It consists entirely of stems and flowers, for being a parasite it has not even roots properly so called. You might at first sight suppose that some animal, clothed with very thick red hair, had been stripped by the prickles of some of its coat, but a closer examination will soon convince you of your error. The plant consists of numberless long red stems, no thicker than packthread, which climb about in all directions, and send out here and there knots of pinkish, wax-like flowers. The old herbalist Gerard, speaking of it, says, "It is a strange herbe, altogether without leaves or roote, like unto threads very much snarled, or wrapped together, confusedly winding itself about bushes, and hedges, and sundrie kinds of herbes." Threlkeld says, that it is "a nonpareil (*a. plant like no other*) having no leaves, but red threads; and after it has fastened its clasped or small tendrils upon a plant, as line (*flax*), thyme, nettles, madder, or

* *Cuscuta Epithymum*.

such like, it quits the root, and like a coshering* parasite, lives upon another's trencher, and, like an ungrateful guest, first starves, and then kills, its entertainer." Threlkeld is not right in saying that the plant "quits the root," for a little thread issues from the seed as soon as it begins to germinate, and immediately sends out shoots which insinuate themselves into the stems of the plant they fix themselves in, which they weaken, and sometimes destroy.

Another parasitic plant is occasionally found attached to the roots of the furze, called "Broomrape."† It consists of a stout erect stem of a brownish hue, beset with numerous scaly leaves, if leaves they can be called, for they have a dry withered appearance, and are not furnished with stalks. The lower portion of the stem, which is concealed under the ground, is much swoln, and resembles, in some measure, the bulb of a lily, except that its substance is harder, and colour much darker. The upper part of the stem bears numerous largish flowers, of a dirty yellow colour, tinged with brownish purple. There are several species, most of which grow on different plants. The one, for instance, which I have described, prefers the furze; another, the roots of ivy; a third, clover. On the sandy sea-shore of Cornwall one variety chooses the roots of the sea-carrot, and is very abundant in such situations. That which grows on the furze is the largest, frequently attaining the height of two feet, and overtopping

* Visits paid by landlords to their tenants in Ireland, when they help themselves liberally to whatever strikes their fancy, are called "coshering visits."

† *Orobancha major*.

its supporter. Unless carefully sought for, it will probably escape your notice, from its great resemblance to the withered stem of some plant which has resisted the storms of the preceding winter.

I must not omit to direct your attention to the "Brake-fern,"* the most abundant of all the plants of that tribe growing in England. This species bears its seeds on the back of the frond, like the others which I have described, but arranged in a continuous line round the edge of the leaflet, and not in scattered dots. If, about the end of May, you pull up a stem, so as to bring with it its dark brown base, and cut through the latter with a sharp knife, held in a sloping direction, you will find that the vessels in the interior are arranged in a very singular way. One side of the stem is indented, so as to form a groove or channel. From this side the section should slope downwards. Look at it with this side turned towards you, and you will have a tolerably good representation of a spreading oak; reverse the stem, and the arrangement of the dark vessels resembles a spread eagle.† Early in spring its light green stems present a singular and pleasing appearance. The young plant is delicate and impatient of frost, to which, from its growing in bleak situations, it is much exposed. But the tender leaves are protected in a very extraordinary way; the middle part of the stem is the first which appears above the surface of the ground, the leaves remaining buried for a considerable time, indeed, until the spring frosts are nearly past, or they have gained sufficient strength to stand against them.

* *Pteris aquilina*.

† Hence the name *aquilina*, from *aquila*, an eagle.

In summer the places where ferns abound are favourite resorts of the deer.

“The wild buck bells from ferny brake.”

In autumn and winter the bright yellow or red tint which its leaves assume gives a grace to many a landscape, which without it would look cold and cheerless. It is not devoid of useful, as well as ornamental properties; for besides affording a supply of fuel to the poor, and being used as litter for cattle, it forms a tolerable thatch. In some rural districts on the continent, its ashes serve instead of soap for washing, and some preparation of the plant is used in dressing kid and chamois leather.

Should you happen to reside in a chalk or limestone district, you may fall in with some plants belonging to the genus *Ophrys*. One of them, called the Bee-*ophrys*,* or Bee-orchis, produces a flower which, when you see it for the first time, you *must* take for an insect. The Bee-larkspur looks very much *like* a flower into which some sort of black fly has crept, but the Bee-*ophrys* is itself the counterpart of an insect that we may see every day throughout the summer flying from flower to flower, the great, black and grey, drone. Here he seems at length to have settled himself, with the intention of giving up for the rest of his days his musical hum, and exchanging his roving habits for a fixed abode.

Admire, as close the insect lies,
Its thin wrought plume and honeyed thighs;
Whilst on this flowret's velvet breast
It seems as though 'twere lulled to rest.

* *Ophrys apifera*.

Now might its fairy wings unfold,
Enchained in aromatic gold.
Think not to set the captive free—
'Tis but the picture of a bee.

R. SNOW.

Another species is no less singular, the Fly-o-phrys.* The first time I saw this growing, on a common near Bath, I stooped to examine what I thought was a strange-looking fly, settled on a stem of grass, and, of course, was no less pleased than surprised on discovering my mistake.

People are very much disposed to ridicule the delight which Botanists experience on detecting a plant which they have never found before; but the Botanist is well content to be laughed at, and, to pursue his search. All that he has hitherto discovered has been to him a source of pleasure and of profit; so that, when he finds a new subject for examination, he is pleased that a new opportunity of learning something is presented to him. His "new plant" may not be valuable as a medicine, nor for any economical purposes; it may not be ornamental as a garden flower; it may be of no use, as far as he can see, either to man or beast. It *must*, however, afford him a fresh instance of "the wisdom of God in Creation:" there must be something about it different from any other plant that he has seen. Possibly he may discover organs hitherto unnoticed, proving the skilful design of Him, who called it into being. To deem the search directed to such an object *ridiculous*, then, does not bespeak either good sense or right feeling. Some unusual, and appropriate construction of organs with which

* *Ophrys muscifera*.

he is acquainted, may present itself, disclosing an abundantly fruitful subject for contemplation, or he may descry some peculiarity, the object and end of which eludes his most diligent scrutiny. Still his inquiry is not unprofitable, for his failure assures him of the infinite inferiority of man to his Maker, and teaches him to be humble-minded and reverent. If he can perceive nothing remarkable beyond general symmetry, (and this at least is perceptible in every vegetable production,) he can yet admire and adore the goodness of God, in clothing the earth with so many and various tokens of His presence. And, finally, if his "new plant" seem inconspicuous, insignificant, and valueless, he may con in every stem, leaf, and flower, the lesson which his Saviour has appointed to be learnt, that if God so protect and nourish an unprofitable weed, much more will He protect man, whom He created in His own image.

No one, I believe, has attempted to assign any reason why the plants which I have described, and many others belonging to the same tribe, should be furnished with flowers resembling insects; but if the inquiry is likely to be profitable to me, whether I succeed in my attempt to solve the question, or whether I fail, surely no one has any right to laugh at me because I feel a pleasure when a new inducement to search is presented to me. I would strongly recommend you, then, not to be deterred from the study of Botany, or of any other branch of Natural History which you are inclined to pursue, by any sly allusions made to persons "who will walk for hours over heaths and bogs searching for useless weeds," or by any questions as to "What is the use of Botany?"

“To what good does it tend?” Be assured, that the desire of inquiring into the things of Nature was implanted in your heart by the God of Nature. Those who ridicule the notion that there can be any pleasure in the study, speak, probably, as they feel. Not understanding in what the pleasure consists, they do not believe that there is any. You may try to convince them of their error if you please, but take care not to be discouraged by their ridicule till you have made a fair trial; and, when this has been done, I am quite sure that you will stand unshaken, whatever may be said of you, or to you.

And now that we must quit the pleasant velvet turf skirting the common, and proceed homewards, I will repeat to you, as we wend our way, a botanical poem by one of the wisest and best men of the day, who, though no professed Botanist, has studied the Philosophy of Nature, in a spirit happily uniting the thoughtfulness of a Sage with the piety of a Christian, the great Poet Wordsworth.

“POOR ROBIN.*

“Now when the Primrose makes a splendid show,
And Lilies face the March-winds in full blow,
And humbler growths, as moved with one desire,
Put on, to welcome Spring, their best attire;
Poor Robin is yet flowerless, but how gay,
With his red stalks upon this sunny day!
And, as his tuft of leaves he spreads, content
With a hard bed, and scanty nourishment,
Mix'd with the green, some shine, not lacking power
To rival summer's brightest scarlet flower:
And flowers they well might seem to passers by,
If looked at only with a careless eye;

* The small wild Geranium known by that name.

Flowers—or a richer produce (and it suit
The season), sprinklings of ripe strawberry fruit.
But, while a thousand pleasures come unsought,
Why fix upon his want, or wealth, a thought?
Is the string touched, in prelude to a lay
Of pretty fancies, that would round him play,
When all the world acknowledged elfin sway?
Or does it suit our humour to commend
Poor Robin as a sure and crafty friend,
Whose practice teaches, spite of names, to shew
Bright colours, whether they deceive or no?
Nay, we would simply praise the free good will
With which, though slighted, he on naked hill
Or in warm valley seeks his part to fill;
Cheerful alike, if bare of flowers, as now,
Or when his tiny gems shall deck his brow;
Yet more, we wish that men by men despised,
And such as lift their foreheads overprized,
Should sometimes think, whene'er they chance to spy
This child of Nature's own humility,
What recompense is kept in store or left
For all that seem neglected or bereft;
With what nice care equivalents are given;
How just, how bountiful, the hand of Heaven."



CHAPTER VI.

THE MOUNTAIN.



The shadow sleeps upon the hill !
 In Nature's temple all is still.
 With rippling stir the leaflets move,
 Tho' not a gale to wake the grove;
 The lake hath caught a silver crest,
 Tho' not a breath to break its rest.

* * * * *

The Cathedral.

I HAVE not often enjoyed the gratification of rambling over a Mountain, and cannot therefore pretend to be your guide to all that may be deemed interesting in such a locality. Still, the aspect which a mountainous country presents, as it respects vegetation, is so different from anything which we meet with on the plain, that I cannot altogether omit noticing it, however imperfect my description may be. If it happens that you live in a mountainous district, you will no doubt be able to supply much that I have overlooked, and perhaps will take some interest in examining how far my descriptions are correct; but if, on the contrary, you have never set foot on the summit of a mountain-ridge, I hope that the following narrative of a three days' excursion in the Highlands may not be unamusing or uninteresting.

At seven o'clock, on a bright morning in June, 18—, accompanied by a friend, who delighted as

much as myself in exploring the works of Nature, I started from Glasgow, in one of the small steamers which ply on the Clyde, and sailed down the river to Dunbarton, distant about seventeen miles. I was told that, if I completed my short tour without more than one exposure to soaking rain, I might consider myself very fortunate. In addition, therefore, to my usual botanical apparatus, which consisted of a large tin box slung across my back for collecting specimens of plants, a stout knife to answer the double purpose of cutting and digging, a stock of blotting-paper and boards for drying, at the close of each day, whatever plants I might find, I furnished myself with that most unromantic appendage, an umbrella. You may well imagine that I set out in high spirits, anticipating the greatest possible pleasure from seeing new scenery of the grandest and most beautiful description, observing and examining in their native haunts whole tribes of plants, which I had only read of, or seen in a dried state; and all this in a district made interesting by a thousand associations. I was accompanied, too, by a friend, who, though he was familiar with every spot that we intended to visit, was as anxious to renew his acquaintance with them as I was to commence mine, and was prepared to go wherever he thought I should be most gratified, and to do anything that would give me pleasure.

About half-past eight we reached Dunbarton, an uninteresting town to hasty visitors such as we were, and immediately took our places in a sort of omnibus for Loch Lomond, on the shores of which we arrived about ten o'clock. I was not prepared for being so speedily on the long wished-for ground.

I had thought of it so much, that I could scarcely believe that it was so easily attainable.

Even now that I am writing, if I close my eyes, and try to recall the scene which lay before me when I descended from the vehicle, it seems more like an ideal picture made up of the most beautiful things that I have read or thought of, than a landscape which I have actually gazed upon.

It was a most brilliant morning—not a cloud visible — not a breath of wind stirring: a narrow arm of the lake stretched in to the spot on which we stood, and appeared to feed a stream or small river which flowed in an opposite direction. The clear water with its glassy surface was fringed by a bright green turf; at a short distance lay two little steamers (even *these* appeared picturesque here) waiting to receive passengers; and beyond all stretched “the everlasting hills,” some rising from the very edge of the lake, others shewing their variously shaped crests, above and between,—here presenting a bold rugged outline, there a summit as little defined as a mist-wreath. In one or two places a glittering white spot shewed where the snow had drifted to an extraordinary depth in the winter, and where a mass still lay unthawed, though the sun shone warmly enough, as I by-and-by found, even at that elevation. I was not however allowed to admire the magnificent scene before me as leisurely as you may have read my description, for I was quickly summoned to breakfast at the little inn of Balloch, since the steamers were preparing to start in a very few minutes. In less than half-an-hour we had been rowed to one of them, and were proceeding on our voyage. As it is not my object to describe scenery, I will say

nothing of the glorious views which burst upon us every time we passed a point of land—of the beautifully-wooded islands, each a little paradise, between which we threaded our course ; scenes, I may remark, which he who has once beheld, may easily recall to mind in all their native colouring and beauty, but of which no power of description can convey an adequate idea to the mind of another. I will only observe, that I was enraptured with all that I saw, and almost sorry when the steamer dropped us at Rowardennan, situated at the water's edge, immediately under Ben Lomond.

We had given directions for our luggage to be left at Tarbet, on the other side of the Loch, and that a boat should be in waiting at the foot of Ben Lomond, to convey us across to the same place in the evening. The interval we purposed to devote to ascending the mountain which I have named, and lost no time before we commenced our journey. The early part of our work was not very laborious, the acclivity being easy, and the springy heather giving a vigour to one's step, which is unknown in the streets of a town, or on a dusty road. The day was intensely hot, but, being resolved to be daunted by nothing, we bent our backs manfully to the work. As we attained some elevation from the lake, our view became extended, and it was, indeed, a feast to rest a while with a prospect before us such as we then commanded. It was nearly the same that we had seen before ; still there were mountains around us, and above us ; but there was this new feature, that we now looked down upon the lake, and could form a tolerably correct notion of its extent in one direction, and could embrace, at one glance, the group

of islands which we thought so beautiful singly as we passed near them. In almost every new spot, too, I observed something characteristic of the sort of country we were traversing; so that our intervals of rest proved no loss of time.

One of the first plants which excited my attention, was the Globe-ranunculus or Mountain Globe-flower. It is a very common plant in gardens and shrubberies, and, as I had only seen it in such situations, it scarcely seemed at home here; but nevertheless *here* undoubtedly was its birthplace, for it grew abundantly in places where the hand of man could not have planted it, and where no one would ever think of scattering seeds either for ornament or profit. It grew in the dripping crevices of rocks; but seemed to thrive best in situations such as those in which we saw it next day, forming large beds in dark shadowy nooks by the lake-side.

I have before drawn your attention to the wonderful care exhibited by Providence in rearing an unfailing supply of grass in the lowland meadows and plains. Another, and a still more extraordinary instance of Divine Wisdom, in designing and executing, came within our notice to-day. The grasses which are most abundant on exposed heaths are, as I have already hinted, furnished with fine long leaves, and elastic stems, little liable to be torn by the tempestuous winds, to which they are peculiarly liable. Both leaves and roots are, in such situations, densely tufted: consequently the former shelter the ground from the scorching rays of the sun, and prevent it from becoming parched; while the latter, being thickly matted and distributed through a large extent of soil, have ample

means of absorbing whatever moisture is contained in the ground, which must, of necessity, at some seasons of the year, be very inconsiderable. Dry, however, though the ground may be, a sufficient quantity of nourishment is always procured to ripen the seeds; hence, if the plant should die, provision is made to supply its place. Of the various kinds which grow in such situations the commonest and most valuable is the "Sheep's* Fescue-grass," so called from its affording those animals an abundant supply of food. The same grass is very common on the sides of mountains; but in such localities it is more liable to be injured by excess of moisture than by drought. Autumn here is more frequently the season of mists and rain, than of scorching sunny weather; consequently the same condition of growth would not conduce to the same end, under circumstances so very different. Plentiful supplies of water would ensure the support of the matured plants, but would prevent the ripening of the seed. Now, mark the wise arrangement by which this difficulty is obviated. In the spring there arises from the centre of the tuft a stalk, bearing a number of buds, and externally resembling the flower-stalk of the lowland grass. As it enlarges, however, instead of developing the rudiments of *seeds*, it sends out little buds of *leaves*, shaped precisely like the root-leaves. During the summer these increase in size, and from their base descend small thread-like roots. Towards the commencement of the rainy season, or when it has fully arrived, they fall off, fix themselves in the ground, wherever they may

* *Festuca ovina*.—*Festuca*, or *Fescue*, is supposed to be derived from the Saxon word *Fest*, signifying "food," "nourishment."



VIVIPAROUS FESCUE-GRASS.

chance to be blown or washed, and by the return of spring have become flourishing plants. One

or two other species of Grass are liable to the same alteration in the mode of propagation; and a somewhat similar phenomenon is occasionally observable in the plains. Grains of Wheat and Barley, for instance, when suffered to stand in the field during a rainy autumn, frequently sprout while they remain attached to the stem; but in this case the seed is matured before it germinates; whereas, in the other, the young plants are produced on the parent plant without the intervention of seeds.

As we ascended, some new variety in the scenery was continually presenting itself. Now the mountains on the opposite side of the lake underwent a change in their appearance, arising, either from our viewing them in a new aspect, or from some alteration of light and shadow. Now the lake itself was the prominent feature in the picture, and appeared to be nearer, in proportion as we mounted higher—then we were high enough to discover many more islands, which had been before hidden from our sight by others between us and them—then some bold rugged rock sloped down by our side, and intercepting half the prospect, made the rest seem ten times more lovely. A bed of beautiful Alpine flowers would then engage our attention. These afforded me gratification, not only because they were beautiful, but also on account of their novelty. I had to examine in what respects they differed generally from those with which I had been familiarly acquainted on the plains, as well as to observe and note the peculiarities of each. One of the most striking was the Alpine Catchfly.* It grew in matted beds thickly studded with large pink or rose-coloured

* *Silene acaulis*.

flowers, which were scarcely raised above the ground, and so far exceeded in size the leaves and stems as to appear the principal part of the plant.

There cleaving to the ground it lies,
With multitude of purple eyes,
Spangling a cushion green like moss.

WORDSWORTH.



ALPINE RUE.

One of the Saxifrages (of which we found but a few patches,* the plants being generally past flower-

* *Saxifraga oppositifolia*.

ing) resembled the Catchfly, both in colour and mode of growth. Both of these lost their beauty in drying, but another graceful little plant retained its elegant form after it had been pressed. This was the Alpine Rue,* which grew abundantly in damp places on the hill-side. A small species of Willow† interested me much, as being the least

of known British trees. Furnished with root, trunk, branches, buds, leaves, and flowers, it rarely exceeded three inches in height. (The adjoining wood-cut is from a drawing of the natural size.) A species of moss,‡ of which the pleasant turf under foot was in a great measure com-



ALPINE HAIR-MOSS.



HERBACEOUS WILLOW.

* *Thalictrum alpinum*.

† *Salix herbacea*.

‡ *Polytrichum alpinum*.

posed, everywhere over-topped it. Were I simply to assert, that in some parts of Scotland the moss grows so tall as to rise considerably above the highest branches of the trees, I should scarcely be believed; but you will see, by looking at the drawings of each, that my statement is quite correct.

The day was pretty far advanced when we reached the summit of the mountain; but if our ascent had been much more toilsome than it was, and if, besides this, the interesting objects, which at every step arrested our attention, had been entirely wanting, it would have been well worth all the labour to enjoy, at the end, such a feast for the eyes as was then spread before us. To throw ourselves at length on the grass at the summit, and to assure ourselves that what we beheld was a real scene, was the employment of the first few minutes. To recollect that we were very hungry, and had a sandwich in our pockets, was the next; and never did I partake of so dainty a repast, for, humble as was the fare, it seemed to have imbibed some new and exalted flavour from the enchanting scenery by which we were surrounded. The every-day work of satisfying the appetite seemed to assure me that I really was—not that I fancied myself to be—on the summit of a mountain, and that the view around me comprised hills and valleys, which did not merely exist in my imagination, but might actually be traversed. The weather was still very fine—clouds were constantly passing, but far above us (high as we were), and incessantly varying the shadows thrown on the vast landscape beneath us—not a breath of wind was stirring. Loch Lomond lay

perfectly calm and tranquil 3,200 feet below our resting-place. Loch Katrine and Loch Sloy were perfectly visible in the distance; and, all around, the everlasting hills slumbered on, apparently in the same tranquil repose which they had maintained from the moment when first they were moulded by their Almighty Creator.

By the time that we began to descend, the glare of day had been mellowed into a bright, clear light, which gave a distinctness to the landscape not hitherto observed; and in the mirror of the lake the image of every island and headland was reflected with the distinctness of the original.

The descent was not altogether so easy as I expected. We made for the point directly opposite to the inn where we intended to pass the night, and after a good deal of scrambling among rocks, running down steep places, impelled sometimes at a rate faster than we could have wished, and crossing boggy flats, we reached the Loch-side late in the evening, and were rowed across by two stout Highlanders.

Early next morning we indulged in a swim in the lake; and after breakfast, as we expected to have plenty of walking during the day, hired a one-horse vehicle, which conveyed us and a boy, whom we engaged to carry our basket, to the foot of Ben Voirlich, situated not far from the head of the lake, but on the opposite side to Ben Lomond.

We were again highly favoured as to weather, and as determined to enjoy ourselves as we had been the day before. Our route lay along the side of the lake, by a winding road, which every few minutes supplied a new foreground to scenery,

which, although of the same general character, varied greatly in its details. At times we had before us a broad expanse of water, fringed to the edge with green turf; then we lost sight of the lake entirely, having a thick wood on our right; and on the left, sometimes a valley running far away among the hills, then a deep mass of foliage, and now an escarpment of rocks, richly coloured with many flowering plants and mosses. Among the latter, one of the most beautiful was the Alpine Thread-moss,* the tufts of which resemble cushions of the most brilliant purple velvet. The season for the flowering of the Hawthorn had ended in the plains, but here every tree was in full bloom.

"Soft spring had burst its buds, and summer now
Deckt with sweet garniture each Hawthorn bough.
Hung high in air the Birch in tassell'd pride,
Clasping with tangled roots the rock's grey side."

Among the plants which we found to-day, not the least curious were two mosses, the *Splachnum mnioides*, and *sphaericum*, producing seed most abundantly. They choose to grow on the mouldering remains of animal substance, and only in mountainous districts. A piece of leather or bone, or any similar substance, will, in these high regions, if other circumstances are favourable, be quickly covered by one of these mosses. The specimens which we found were growing on the decaying bones of a sheep. We have here an evidence of the wonderful extent to which the air is charged with the minute seeds of the mosses.

* *Bryum alpinum*.



SPLACHNUM MNIOIDES.

We need not suppose that the peculiar soil possesses the power of attracting such seeds, but rather that they float about in infinite numbers, and are deposited in situations of all kinds, coming to maturity only in those which are adapted to their growth. Another instance is to be observed in a moss which I have mentioned before, as possessing remarkable hygrometric properties.* This, though anything but uncommon in most situations, shews a decided preference for places in which peat or charcoal has been burnt. I have seen a circular spot in a wood, the soil of which was entirely composed of the dust of charred wood, covered with this moss, though not an atom was to be seen anywhere else in the neighbourhood. You may probably have observed in hot-houses, in which ferns are cultivated, that whenever the smallest portion of earth is exposed to the air and light, and has been left undisturbed

* *Funaria hygrometrica*.—See page 79.

for a considerable time, one or two species of fern spring up in profusion; nay, sometimes even the interstices between the bricks in the wall are fringed with them; while, of all the other kinds cultivated, not a single young plant is to be seen. In both these cases it is evident, that, however many sorts of seeds were deposited, those only germinated, to the growth of which the situation was peculiarly adapted. Had it been different in either case, in all probability some other kind would have appeared.

Springing from the clefts of rocks, we found a plant with bluish-green foliage and yellow flowers, resembling in its habit some of the large kinds of Stone-crop. This was the Rose-root,* so called from the peculiar odour which the fresh root emits, resembling that of the flower after which it is called. The resemblance is certainly striking, but approaches nearer to the smell of rose-water than of the fresh flower.

In similar situations, but generally in the vicinity of water, we found the Mountain-sorrel† in great abundance. Its leaves are nearly circular, large and thick; and, being plentifully furnished with an agreeable acid juice, we gathered a considerable quantity as a substitute for salad, which we added to our repast when we reached the summit of the mountain.

While we were exploring a cavity under a pile of rocks, my companion exclaimed that he heard the bark (as it is called) of an eagle. I had heard the noise to which he alluded, but it sounded to my inexperienced ear like the croak of a raven. The

* *Rhodiola rosea*.

† *Oxyria reniformis*.

boy, however, gave it as his opinion that we had heard the distant note of the nobler bird; and presently, to my great gratification, a pair of these lords of the feathered creation rose from behind a mountain-peak, at the distance of about a quarter of a mile from us. They soared about for a long time, occasionally uttering their short and very peculiar cry, and alighting among the rocks, but never came near enough to allow us to have a good view of them.

The summits of lofty mountains are covered with snow all the year round. In all elevated lands, also, the temperature is much beneath that of the adjoining low countries. This difference is partly owing to the constant exposure of the former to cold winds, from which the plains are more or less protected; but chiefly to what is called the "*radiation of heat*." I ought, perhaps, to explain what I mean by these words.

All bodies, whatever their temperature may be,—that is to say, whether we should call them *warm* or *cold*,—have a natural tendency to part with their heat, which, in conformity with this law, is constantly proceeding from all parts of their surface, and in all directions, in straight lines. For example, if we were to suspend a mass of hot iron in the centre of a room, it would gradually cool; that is, it would *radiate* its heat in all directions, until the floor, the ceiling, and the sides of the room had all attained the same temperature with itself. The various parts of the room would also radiate heat at the same time, though in so small a proportion to that received from the iron, that it would be scarcely perceptible.

This property, I have said, is common to all bodies. But it is evident that the greater the bulk of a body when compared to the surface which it presents, the less heat it radiates, or, in other words, the longer it takes to cool. For instance, a spherical mass of iron will retain its heat longer than the same quantity of metal would if beaten out into a thin plate; so, an irregular body, a cinder for instance, taken from the fire, cools first at the extremities or projecting points; and again, to adduce an example,—which I dare say will make you smile,—if you go into the open air in a cold day, the parts of your face which suffer most from the cold will be your nose and your chin. Now, mountains are to the mass of the earth what your nose and your chin are to your face. They radiate the heat which they have received from the sun long before the parts which are nearer to the centre of the globe, and become so cold that snow falling on them does not thaw, but remains without diminution from year to year. A thermometer suspended only a few feet from the earth's surface indicates a temperature sensibly lower than it would if placed on the ground; because, in the latter case, it receives heat from the earth by radiation in a greater degree than when placed at a distance from it.

Another exemplification of the same law is afforded by the phenomenon of Dew. Walk through a meadow early in the morning in winter after a clear night, and you will see every blade of grass fringed with sparkling crystals of hoar-frost, while the pathway is not in the least affected. Take the same walk on a summer's morning, and, if the sky has been cloudless during the night, every leaf,

twig, and stem will be laden with refreshing dew, the bare ground being everywhere perfectly dry. How does this come to pass? It is undoubtedly most desirable that the genial moisture should descend on the thirsting herbs rather than on the unproductive pathway, especially in the summer; but by what agency is this end effected? Simply by the Providential Law to which I have alluded. The blades of grass radiate their heat, while the ground itself remains comparatively warm. The moisture floating in the atmosphere is condensed on them; it is received through the open pores into their substance; it supplies them with abundant nourishment, parched as they are with the fervent rays of the preceding day's sun; while the barren ground receives not a drop of the refreshing shower, for here it would be expended in vain.

I was never more forcibly struck with this wise provision for supplying the wants of the vegetable world than on one occasion when I happened at night to pass by one of the parks in London. The season was spring; there had been no rain for many days, so that the roads were everywhere thickly laid with dust. Notwithstanding this, as I passed under the branches of a tree, I found that from the point of every twig was suspended a large drop of water, and that the ground underneath was saturated with moisture. A few moments' reflection was sufficient to explain the truth. The cold branches arrested and condensed the minute particles of water, as they floated by in a mist so dense that I could not see many yards before me, and from this source the swelling bud was plentifully supplied with the nourishment

which at this season it so much needed. What a commentary have we here on the passage, "There went up a mist from the earth, and watered the whole face of the ground!"

In a kind of ravine, or rather hollow, among the rocks, not very far from the mountain's top, we fell in with a large mass of snow, the appearance of which was most strange under such a scorching sun as that to which we were then exposed. It was not soft and opaque snow, such as we generally find lying on the ground in the winter; but was composed of large, hard, and clear crystals, resembling hail. Its surface extended over many square yards, and it seemed in some places to be from ten to twenty feet deep. The foliage of the small plants in the immediate neighbourhood, which, to all appearance, had but recently been uncovered, had, as might be expected, suffered much from their protracted exposure to wet and cold, and from the absence of light; but their vital powers were evidently not in the least impaired. This was remarkably exemplified in a species of Moss* which grew abundantly on the very verge of the snow, and, to all appearance, had only been a few days uncovered. The leaves investing the lower portion of the stem were nipped, and of a dingy, blackish-green hue; but every stem was surmounted by a vigorous bright shoot, which seemed to make up for the time lost under its cold envelope by the rapidity of its growth now that it was restored to heat and light. I could readily believe the statements made by travellers of the amazingly short time which elapses in Northern regions between the thawing

* *Bartramia fontana*.

of the wintry covering of the earth, and the conversion of cheerless plains into flourishing pastures and corn-fields.

One can scarcely help observing here the strong analogy which exists between animal and vegetable life ; an analogy made sufficiently evident by comparing the habits of each, on various occasions, but more particularly so in the present instance. In the more temperate regions of the globe, the appearance assumed by almost all plants during the summer months presents a very striking contrast to their state during winter. They either perish entirely at the first approach of cold, or die down to the ground, retaining the living principle in the roots only. In this latter case respiration ceases ; the transmission of sap is almost, if not quite, suspended, the plants themselves suffering no injury. In some cases they shed their leaves, flowers, and fruits, the trunk and branches remaining in a state of sluggish inactivity, till the returning heat of summer, or that produced by artificial means, shall have called them to renewed action ; or, like the Northern and Alpine plants, they remain buried beneath the snow, unaltered in appearance, and awaiting only the return of genial weather to burst into life with redoubled activity.

Just so is it in the animal world. The quickly growing, and quickly perishing, Mushroom is equally the child of a day with the May-fly, which in the morning dances along the surface of the stream, in the evening finds a grave in the same element. The butterfly, beneath the enlivening influence of a summer's sun, sports its few weeks, or perhaps months, fulfils all the

offices for which it was created, and, like the annual herb, is seen no more. The bat, the marmot, and the dormouse, at the first approach of winter, desist from their ordinary habits, cease to hunt after their prey or to evince any necessity for food, retire to the haunts best adapted to their nature, and from whence they may most easily emerge on the return of spring. In this retirement they suffer a great diminution of temperature,—they breathe slowly, and only at intervals, proportioned to the depth of their slumber, sometimes with long periods of total intermission,—the circulation of their blood becomes languid to such an extent, that even the pulsation of the heart is scarcely felt,—the animal irritability decreases, so that limbs may be lopped off, and even the vital parts laid open, almost without exciting any symptoms of feeling. The action of the digestive organs is suspended, the body becomes gradually emaciated and diminished in weight; and all this takes place without in the least degree impairing the living principle, which, on the contrary, is found to be in a remarkably active and energetic state at the period of revival. Others, whom nature has not directed to retreat before the wintry cold, as the sheep and the goat, and very many of the feathered tribe, oppose as bold a front as possible to the inclemency of the season, and assume an additional covering of wool, hair, or feathers, just as the forest-tree withdraws, as it were, within its rugged bark all the more delicate parts, which, if suffered to remain, would be scattered by the fury of the wind, or nipped by the frost. Within the tropics, where summer and winter are scarcely distinguished, except by the

astronomer, no such simultaneous shedding of leaves takes place. The tree is constantly parting with a portion of its leaves, and as constantly repairing its loss, so that no phenomenon takes place similar to that which we call the fall of the leaf. Quite analogous to this is the moulting of birds, which are constantly casting off their old plumage and assuming new; so that, like ever-greens, and the palms of the tropics, they always present nearly the same appearance.

I cannot pursue this subject farther at present, interesting though it is, but will remark merely, that in climates which are subject to very long droughts, during which no plants can derive any nourishment from the ground, the roots of such as are not supported by the air only choose this as their season for resting. They shut up all their pores, so as to lose none of their stock of moisture by evaporation, and remain, perhaps for a very long time, buried in the driest sand, or imbedded in a hardened mass of the closest clay, but, on the return of the rainy season, spring suddenly into life and verdure. But it is time for me to return to my subject.

Just below the summit of the mountain, we came upon a small lake or tarne, round the shores of which we found a variety of mosses, but very few flowering plants—none indeed which could be considered rare. The season for Alpine plants had scarcely yet arrived; for my companion, who visited the same spot about two months afterwards, found growing in the greatest abundance many plants of which we now saw no signs.

The last part of our ascent was performed very quickly, for the recollection of the prospect which

we had enjoyed from the top of Ben Lomond the day before made us anxious to survey, as soon as possible, the scenery which we knew awaited us when we reached our destination. We found a delightful resting-place when we had gained the summit. The mountain does not terminate in a single peak, but in two tops of nearly equal elevation, connected by a level surface, composed principally of long soft moss, intermixed with a few kinds of grass and lichen. Here we stretched at length, and while we ate our repast, consisting of sandwiches and mountain-sorrel, contemplated a prospect which I will endeavour to describe.

Just opposite, and apparently near enough to be touched, rose piles of mountains of every variety of tint and shadow, — from the white snow, which lay in patches near their summits, to the darkest of all possible greys. As far as the eye could reach, they towered up, tier behind tier, till they were lost in the hazy distance. About midway between us and the horizon we descried a small portion of the Clyde; two thousand feet beneath us lay a mountain tarne, Loch Sloy, fed by two little rivers, which, being in a line between us and the sun, looked like threads of burnished silver. Beneath us, on the left, rose another summit of Ben Voirlich, shutting out from our sight a part of Loch Lomond, but allowing us a full view of

“All the fairy crowds
Of islands, which together lie
As quietly as spots of sky
Among the evening clouds.”

To the right appeared another shoulder of Ben Voirlich, nearly equal in height with our position,

and forming a beautiful fore-ground to the landscape in that direction. Behind, and 3,000 feet beneath us, reposed the deeper part of Loch Lomond, the waters of which wore a hue as black as ink. A little way down lay the tarne which we had just skirted, and here and there were visible huge masses of snow, destined apparently to retain their places until winter came again. Not a sound was to be heard, but the occasional bleat of a sheep, or the bark of an eagle; we might have imagined that every portion of the scene around us was unseen by any eye save our own, and that of Him who created it. The recollection, however, that the base of the mountain was seven miles from our inn, that the day was wearing, and that we had no vehicle awaiting us when we should reach the road, at length roused us from our resting-place; and, invigorated with enjoyment, we commenced our descent in the direction of Loch Sloy, this side of the mountain being the nearest to our destination. Few tourists take the trouble to climb Ben Voirlich; and the boy who accompanied us, being neither a lover of the picturesque nor a botanist, was as much a stranger to the ground which we were to traverse as ourselves, and was utterly inefficient as a guide. Hence it happened that, when we were within two or three hundred feet of what we believed to be the base of the mountain, we found ourselves at the verge of a precipice, along the edge of which we were obliged to scramble for nearly a mile, and in a direction opposite to that in which we had hitherto been proceeding. We were, however, rewarded by meeting with a spring of deliciously cold water, lined by a mass of yellow Mountain

Saxifrage,* which (this being the sunny side of the mountain) was in full bloom, and with its large flowers beautifully spotted with orange, was well worth the trouble of visiting in its native haunts.

After reaching the shores of Loch Sloy, little occurred worthy of note during the remainder of our march. We had a long scrambling walk by a foot-path, which was every now and then lost in the dry channel of a mountain stream, or the yet more uncomfortable footing afforded by a morass. The sun had long set when we arrived at the main road; and the heat being moderated, and our path level and easy, we could contemplate at our leisure the deepening shadows of the mountains, and the altered appearance of the Loch, which, when we passed by the same road some hours before, was resplendent with the blaze of morning. We reached Tarbet at ten o'clock, and after a hearty tea, which at the end of such a day's journey was not very likely to interfere with our night's rest, sought in repose a preparation for our next day's excursion.

Next morning, between eleven and twelve o'clock, we embarked on board the "Loch Lomond" steamer, and were taken to the head of the lake. There we landed a few passengers and returned to Inversnaid, where there is a picturesque mill and waterfall.† This romantic spot, independently of its natural beauties, is rendered interesting from having in its neighbourhood the cave to which the notorious freebooter, Rob Roy, used to retire when too hotly pressed by his pursuers. Nearly oppo-

* *Saxifraga aizoides*.

† See frontispiece.

site Inversnaid we passed a beautiful islet thickly planted with larches. The noise of the steamer had disturbed a number of herons, who were amusing themselves near the shore. As we came near, they rose majestically, and fanned themselves to the trees on the island, some of them alighting on the topmost boughs, whence they leisurely contemplated the little vessel as it shot away. The water here wore an exceedingly dark hue, even when we were only a few feet above the surface. This I suppose is attributable partly to the peculiar tint which prevails in all mountain waters, partly to its depth, here very great, and partly to its being overshadowed by lofty mountains. The prospect was very grand. Every object on which the eye rested, excited some pleasurable emotion, mingled with a feeling of thankfulness and adoration towards the beneficent Creator, Who had surrounded us with so many lovely and magnificent symbols of His goodness and majesty. The deep and placid lake, the brilliant foliage skirting its shore, the white masses of hawthorn blossoms, "the tops of the ragged rocks," the occasional sheets of snow, affording even in mid-summer a cool and refreshing beverage to the flourishing vegetable productions beneath, the mountains soaring to heaven — formed, indeed, a rare combination of beauty and sublimity; nor was it difficult to imagine, that, from every portion of the goodly scene, the silent incense of adoration was ascending to the Divine Author of all. "Earth with her thousand voices praises God."

At Inversnaid we landed, with several other passengers, who like ourselves intended to visit Loch Katrine, the scene of Scott's poem of the

Lady of the Lake. The distance is about five miles, and as the former part of the way—*road* it can scarcely be called—is very steep, and the weather was oppressively hot, the Highlanders, who during the summer months gain a livelihood by lending ponies to travellers, could scarcely be persuaded that it was our intention to walk. In vain we protested that we purposed to use our own legs. It was contrary to all precedent to allow our luggage to be transported on the backs of beasts, unless we ourselves adopted the same mode of transit. Consequently we were compelled to pay as much for the conveyance of our portmanteaus, &c., as if we had hired ponies. I was not a little amused at the pertinacity of two of these horse-proprietors, who, until we had gained the brow of the hill, (which, to confess the truth, was rather toilsome work,) rode close by our sides, as if to display the superior comfort with which they proceeded—reminding us ever and anon of the steepness of the ascent, and the excessive heat of the weather, evidently hoping that we should soon “give in” and accept the accommodation of their ponies, which, as their companions, they said, were not in sight, they offered to us, as a special favour, at a lower rate than was usual. As we drew near to the termination of the acclivity, they grew still more moderate in their charges; but on reaching level ground and seeing that we were inexorable, they pressed forwards, and to our great comfort we saw them no more. We were, however, but indifferently rewarded for our labour as Botanists, and saw nothing of which we should not have been able to enjoy a very good view as equestrians. I could not help wondering whence, in the olden time, could have congregated the

sturdy bands, who at a moment's warning flocked to the standard of their chief. The few cottages we saw, gave little evidence that they could furnish the bold warriors who were formerly so ready for field or fray. The ruins of Inversnaid Fort, however, built to repress the daring inroads of Rob Roy, assured us that times must have been indeed different, when it was thought necessary to station here a regiment of regular troops; and when we recollected the numbers of families who have emigrated to America, or devoted themselves to peaceful employments in Glasgow, Paisley, and other commercial towns, or turned their attention to agriculture in the more highly favoured districts, we could scarcely regret to find the country so deserted.

At Loch Katrine we had to wait some time for luggage-bearers, who, we found, were now about to become our boatmen; and very entertaining boatmen they were. One of them in particular recited to us long passages from Scott, and pointed out to us the various spots alluded to in the *Lady of the Lake*.

To describe the beauty of Loch Katrine, the Trosachs, &c., would be entirely out of my power, even if it entered into my subject. Suffice it to say, that at nightfall I seemed to have been dreaming away some weeks of my life in an imaginary land, the only thing that appeared real being my preparation for sleep.

I must not, however, omit to mention that, although it was nine o'clock when we reached Calender, it was still so light that we were induced to set off to visit Bracklinn Bridge, distant about a mile from the village. Scott, in his notes to the *Lady*

of the Lake, says of this romantic spot, "This is a beautiful cascade, made at a place called the Bridge of Bracklinn, by a mountain stream called the Keltie, about a mile from the village of Callender in Menteith. Above a chasm where the brook precipitates itself from a height of at least fifty feet, there is thrown, for the convenience of the neighbourhood, a rustic foot-bridge, of about three feet in breadth, and without ledges, which is scarcely to be crossed by a stranger without awe and apprehension." The stream still retains these characters, but the bridge is now furnished with a hand-rail. So brilliant was the twilight, that, though there was no moon, I gathered and was able to distinguish from the description which I had read and recollected, a species of *Persicaria** which, like a grass I have already mentioned, *Festuca vivipara*, produce young plants instead of seeds. It was long past ten when I gathered, and found no difficulty in discriminating, two species of *Orchis*. So ended the third and last day of my botanizing among the mountains. Next morning, at seven o'clock, we took our seats on the Stirling coach, and, the same evening, accompanied the Professor of Botany at Edinburgh through the splendid conservatories of the Botanic garden, where, among tropical palms and ferns, we were able to draw forth from our cases living specimens of a plant,† which happened to be the subject of the evening discussion, a humble native of the Scottish Alps.

* *Polygonum viviparum*.

† *Sibbaldia procumbens*.

CHAPTER VII.

THE BOG.

In human works, though laboured on with pain,
 A thousand movements scarce one purpose gain;
 In God's, one single can its end produce,
 Yet serve to second, too, some other use.

POPE.

You are not yet, I suppose, so deeply in love with Botany as to be disposed for a ramble through a bog. As you may, however, during some of your excursions over heath or mountain, happen to encounter one, it will not be amiss if you come prepared to gather from it all the information that it will afford. I took you with me to Scotland, when we resolved to examine the botanical treasures of a mountain; and perhaps we should be able to find better specimens of a bog in Ireland than elsewhere. But there is no necessity that we should cross the channel; for we may find in England numerous places in which the phenomenon I am about to describe exists on a sufficiently large scale to afford us a very good example.

We will suppose, then, that we are traversing what is called a subalpine district; that is to say, a range of uncultivated hills, not so high as to deserve the denomination of mountains, but still so far partaking of their characteristic features and

vegetation as to be strikingly distinguished from the lower and cultivated country. We have been making our way through stunted Heath and Furze, till we arrive at a place where there is evidently more moisture than is congenial to the flourishing growth of the plants which are generally to be observed in such districts. Furze bushes suddenly disappear; the turf is no longer composed of Fescue-grass, wild Thyme, &c.; but gives place to several kinds of Sedge, which are to be distinguished from grasses by the glaucous* hue of their leaves. The only kind of Heath which is to be observed, is the "Cross-leaved;"† here and there is discovered a bunch of rushes; one or two species of Willow seem to be striving to acquire the magnitude of trees; the air perhaps is scented with an aromatic odour proceeding from "the Dutch Myrtle," a low shrub with shining purplish-brown stems, which, if the season be spring, is loaded with catkins—if summer, is as thickly invested with leaves not unlike those of some kinds of Willow. The most remarkable plant, however, is the Cotton-grass,‡ waving to and fro its tufted heads of glossy silk, and bending uninjured before the severest blast. If we proceed at all, it must be with caution, for, if we make but a single false step, we run the risk of sinking deep into an abyss of water and fine mud. Experience will tell the Botanist where he can plant his foot with safety. He knows what

* The word *Glaucous* is used to describe the peculiar bluish bloom which is to be observed on the leaves of the Pink, and many other plants, easily removed by rubbing the leaves with the finger, but leaving no stain on it.

† *Erica Tetralix*.

‡ *Eriophorum*.

plants have long spreading roots, those which interlace each other so firmly as to allow him to trust his weight without danger of sinking; and, on the other hand, those whose roots descend almost perpendicularly into the soil; as well as those which, depending principally on their leaves for sustenance, can scarcely be said to be furnished with roots at all. But even the Botanist advances with great circumspection, and takes care not to remain long in the same spot; for the ground on which he treads is most treacherous. Howsoever firm the surface may appear, in all probability there lies underneath a subtle mixture of water and decayed vegetable substance; in which, if the crust on the surface were broken through, he would run the risk of being suffocated. If, when he reaches a spot where the soil appears to be tolerably solid, he stamps heavily with his foot, the ground, to the distance of many yards around, vibrates to such a degree that the stoutest plants are violently shaken. Now, how comes it that the soil here is so different from that adjoining it? But a few yards off, the ground is solid and compact, nay, in some places rocky; while here it is doubtful whether it should be called with greater propriety earth or water.

The formation of such bogs is to be attributed in great measure to a few humble plants, individually of little importance, but collectively contributing more to the alteration in the appearance of a country than most plants of greater notoriety and statelier growth. I have already spoken of the important part sustained by the Mosses and Lichens in covering a barren district with soil

adapted for the support of various kinds of plants ; we shall now see that the former, the Mosses, are not less instrumental in the formation of peat-bogs.

Many years ago the ground on which we are standing was considerably lower than it now is. Instead of being composed of water and mud, it was probably a hollow place, presenting only a rocky surface, or furnished with a scanty coating of mould washed down from the adjoining banks. During the rainy season water would lodge here, forming a shallow pond, on the edges of which germinated the seeds of several species of moss, which delight in excessive moisture.* These gradually extended over the whole area occupied by the water, and rose above its surface, forming a congenial place of growth for many aquatic plants. These mosses are furnished with very long stems, the lower portions of which, having flourished for a definite period, decayed, while the upper parts still continued to vegetate. Their decomposed substance would afford a kind of soil favourable to the growth of other plants, the seeds of which would be lodged here by the wind or floods, till, in the course of a few years, the ground bore on its surface a half-floating mass of vegetation, the moss still elongating itself, and striving to overtop the other plants which grew among its tangled stems. The bark of many of these plants is furnished with a substance which, when dissolved in water, possesses the peculiar property of preserving from decay most kinds of vegetable as well as animal matter. This is the

* *Sphagnum obtusifolium* and *S. acutifolium*.

astrigent substance called *tannin*, found so abundantly in the bark of the oak, and used for the preserving of hides, or the converting of them into leather. That the water of bogs possesses this property of preserving animal substance to a very great degree, may be inferred from the fact that the bodies of men and horses have been repeatedly found which have not undergone the least change from decomposition, though they must have lain many years in that situation. That it is equally efficacious in preserving vegetable substance from decay is no less evident; for, when a bog is drained, the substance of the soil, to the depth of very many feet, is found to be almost entirely composed of vegetable fibre, scarcely altered in appearance from its original state when it formed the principal constituent of living plants. This substance, called *peat*, when cut into pieces of a convenient size and shape, forms an excellent fuel. In some places, these peat-bogs occur of very great extent, and are probably the site of ancient forests. That many of them were formerly covered with trees of great magnitude, there can be no doubt; for they are found in great numbers embedded in the peat, perfectly sound, and in every respect, (with the exception of colour, which is very dark,) preserving their original appearance. In some parts of Ireland, the only kind of wood used for fuel, building, and the other purposes to which this material is usually applied, is dug up from the bogs.

This strange alteration in the face of a country may thus be accounted for: suppose a forest of oaks, birches, or firs, (for these are the trees usually found in peat-bogs,) to have been over-

thrown by a tempest, or, by what appears with far greater probability to have been the case, by one who, next to Time, is the greatest of all destroyers—man, and that they were suffered to remain where they fell, the scattered trunks would materially affect the drainage of the country; that is to say, they would, in the rainy season, prevent the water from escaping to the valleys, and retain it here and there in shallow pools. The ground would soon become unfit for the reproduction of trees, but eminently adapted for the growth of mosses of various kinds, and more especially those which delight in moist situations. These would germinate, and, very soon overtopping the trunks of the fallen trees, would thus originate a process similar to that described above. In time, bog plants of various kinds would appear, which, by continually elongating themselves, and having their undecayed stems and roots interlaced with each other beneath the surface, would produce an annually increasing stratum of peat; a substance which, in districts where it abounds, is scarcely less valuable as fuel than wood, or even coal. In those parts of Ireland, especially, where bogs of very great extent occasionally occur, the country people not only supply themselves with firing from these inexhaustible, because always increasing, stores, but obtain an abundant supply of sound and well-seasoned timber, well-adapted to all the uses to which timber is ordinarily applied. It not unfrequently happens that the bones and antlers of an extinct species of elk are found deeply buried beneath the surface, rendered by the tanning properties of the water by which they are surrounded more durable than even iron itself, for they are

scarcely altered from their original colour and substance ; while iron vessels, which are sometimes met with, are so corroded as scarcely to retain any of the properties of the metal of which they were made. This remark, of course, does not apply to the precious metals. Golden ornaments, of a strange form and unknown use, have sometimes been found as bright as when they left the hands of the maker.

It is possible, that where we are now cautiously picking our steps among tufted sedge and rushes, may lie buried the ruins of some ancient village, once glowing with the active and cheerful life of a rural population : we may now be resting our feet where, at some remote age, waved the branches of oaks under which the Druids assembled to perform their mystical but inhuman rites. Their rock-altars and pillared circles yet remain in places where no trace of wood or forest is now visible. It is not likely that these were originally erected so far from the consecrated grove as they now appear to be, for there is every reason to suppose that the Druids, like the priests of the ancient German tribes, and the still more ancient Phœnicians, erected their altars in the neighbourhood of "groves," as well as in "high places." If, then, we are inclined to mourn over these barren and desolate portions of the country, presenting so melancholy a contrast to what may have been their former flourishing state, let us not forget that, with the rich foliage of deep forests, has passed away a depth of ignorance and superstition, which we cannot realize in imagination without shuddering ; and that bleak though the country be, compared to what it once was, it is visited by those only whose hearts we hope have been

softened by the mild and peaceful influence of Christianity.

The time may come when art shall assist nature in producing another and as great a change in the appearance of these sterile regions, as unaided nature has slowly and silently effected. Valuable ricks of corn may sometimes be seen even in the centre of a reclaimed bog, which in the memory of man scarcely produced a blade of grass fit for the food of cattle, and where no cattle would venture in quest of it. Draining, turf-burning, manuring, and ploughing, have effected a great deal; and rendered more efficacious, as these operations yearly are, by science and experience, it is not improbable that thousands of acres may, in the course of a few years, be reconverted into arable land or forests; healthful farm-houses may rise over the ruined villages of our pagan forefathers; and Christian churches, resting their foundations on undiscovered cromlechs, may hold within their walls many generations of devotees, worshipping at an altar where the sacrifice of prayer and praise will be offered with well-grounded faith, and be freely accepted. "Then shall the wilderness and the solitary place be glad for them, and the desert shall rejoice and blossom as the rose."

Those districts in which coals are found, afford a yet more prolific subject for speculation, even than peat-bogs. Here we have not merely a single stratum of altered vegetable substance, but numerous seams (as they are called) overlying one another, and alternating with layers of sandstone or lime. That coal is of vegetable origin, there can be no doubt. But, how it attained its present position, is a matter involved in mystery. It was

thought, at one time, to have been brought down by some mighty river in its original condition, and to have been deposited at the bottom of a lake, where, having passed through various stages of decomposition, it assumed its present form. It is now, I believe, considered to be composed of an assemblage of plants of various kinds which grew and decayed in the spot where their remains still continue; but by what process these became covered by a bed of rock, and by what subsequent operation of nature beds of coal and stone were deposited above, are questions which no one has satisfactorily solved. That water was in some way a powerful instrument in producing these phenomena, cannot be denied, since the skeletons of fish, and remains of other aquatic animals, are frequently found in the overlying rocks. In the coal itself are frequently found impressions of various kinds of plants, quite distinct from any which are now found growing in the same latitudes, but bearing a striking similarity in their construction to the plants of tropical countries. Not only stems and leaves have been discovered, but even fruits have been detected in such a state of preservation, that Botanists have reduced them to their proper orders, having been able to distinguish and describe their peculiar characters. This subject, however, is connected with Geology, rather than with Botany; and I mention it here, not so much with the intention of tracing any analogy between the formation of coal and peat, as to show that plants may be altered in their character, even more than they are after having been converted into the latter substance, and may yet be traced with certainty to a vegetable origin.

A very curious little plant, which is frequently to be observed in peat-bogs, is the Sundew.* There



ROUND-LEAVED SUNDEW.

are several species of it; but the most common, called the "Round-leaved Sundew," is quite as remarkable as the rarer kinds. The plant consists of a very small root, five or six circular leaves,

* *Drosera rotundifolia*.

about half an inch in diameter, and a stem which rises from among them, to the height of from two to four inches, bearing a few inconspicuous flowers. The leaves are concave, and thickly invested on their upper surface with hairs of so bright a red colour as to make the plant conspicuous at some distance. Each hair is terminated by a minute drop of viscid fluid, which does not evaporate during hot weather, but seems to be abundant in proportion to the brightness of the sun. It appears to be useful by entangling any small insect which alights on the leaf, either accidentally, or perhaps mistaking the glittering drops for some delicious food. Once caught, its destruction is inevitable; its struggles serve to spread the clammy fluid over its body, and finally it becomes so entangled among the hairs that it cannot extricate itself, but perishes on the spot. It is difficult to say what advantage our vegetable spider derives from these insidious machinations. Possibly the juices of the decaying insect may be absorbed by the plant, or perhaps the gases evolved during decomposition may be inhaled, and converted into solid vegetable substance. It is certain that, where the insect dies, there it crumbles into dust, for you can scarcely examine a plant without finding the remains of flies and other small insects, in various stages of decomposition. This property of entrapping insects is not peculiar to the Sundew. Several plants, bearing the appropriate name of Catchfly,* have their stems invested, just below each of the knots, with a ring of viscid matter easily perceptible by the finger. Insects, endeavouring to climb

* *Silene*.

up the stem, are caught in this, and may frequently be discovered, struggling in vain to extricate themselves. A very singular flower, which we see sometimes in gardens, is the *Aristolochia*; it has a tube, narrower than that of the Honeysuckle, but the lower end of which suddenly expands and forms a bulb. The narrowest part of the tube is furnished with a row of hairs, pointing inwards, so that flies alighting on the flower in quest of honey find very easy access, but, when they have satisfied themselves, find it impossible to return, in consequence of the passage being blocked up by the points of the hairs; they are therefore kept close prisoners until the flower fades, when they regain their liberty. You have, I dare say, noticed in many flowers, especially the larger kinds, such as the Lily, a quantity of fine yellow powder: now, in order that a flower may produce seeds, it is necessary that some of this powder, called pollen, should be removed from the place where it grows, to another part of the flower. In ordinary cases, this is effected by the wind: but, in the *Aristolochia*, the wind can have no power; the whole of the interior of the flower being so thoroughly sheltered, that not a grain of pollen is disturbed, let the wind blow as hard as it may. To remedy this seeming defect, God has "prepared a worm." An insignificant fly, in quest of a particle of honey, alights on the petal of a flower, and, guided probably by an instinct, the very nature of which is unknown to us, discovers the place where the store of sweet fluid is secreted. It finds no difficulty in obtaining admission; but being disappointed in its endeavour to return by the way it entered, travels round and round its chamber, seeking some other

mode of exit. Its efforts, though expended in vain, as it regards its own escape, are not altogether profitless, for in the course of its wanderings it dislodges some grains of pollen, and conveys them unwittingly to the place where they were wanted. By these means the seed-vessel is rendered productive; and then, the flower having fulfilled its end, fades, and the poor prisoner is released from his treadmill labours.

But, perhaps, the most sanguinary of all vegetable fly-catchers is the Venus's fly-trap. The leaves of this plant are terminated by two lobes, armed with several long spines, which, when a fly alights between them, lock into one another, and crush the unfortunate visitor to death. Specimens of this plant are sometimes to be seen in hot-houses.

Most of the grass-like plants which are to be found in bogs, and on the banks of ponds and canals, belong to the genus *Carex* or Sedge. Some of the smaller kinds afford a coarse pasturage for cattle; but the larger sort are so rigid and tough that animals will rarely touch them. Some species, growing for the most part on the banks of rivers, are very handsome plants; one particularly,* which bears at the extremity of a stem, two or three feet high, a group of purplish-black catkins, is a very stately herb. You must use some degree of caution, however, in attempting to gather it, for the angles of its three-cornered stem are armed with minute points, like the teeth of a saw. All the sedges have stems more or less triangular, and by this mark they may be distinguished from

* *Carex riparia*.

the grasses, which are universally furnished with round stems. With the exception of contributing to the formation of peat, and helping to bind together the soil which composes the banks of rivers, the sedges are of little service to man. The leaves of the larger kinds, however, are used in Kent for tying hops to the poles; and, according to Linnæus, the leaves of some species, after having been combed and dressed, like flax, are used by the Laplanders as a lining for gloves and shoes; their hands and feet when thus protected, he says, are never frost-bitten.

Cotton-grass,* called in Scotland *canna*, affords a vegetable silk, which is said to have been occasionally woven into articles of dress. But, although this may have been done as a matter of curiosity, the fibre is evidently too weak to be applied to any really serviceable use as clothing. It may, however, in default of a more elastic substance, be advantageously used to stuff mattresses and pillows.

Rushes are too well known to need any description. They were formerly used in England for strewing the floors of rooms, a custom which has disappeared since the introduction of carpets. For this purpose the Sweet-sedge† was preferred, on account of its agreeable aromatic odour. But, this plant not being abundant, it is most likely that common rushes were used on ordinary occasions. One of the charges brought against Cardinal Wolsey, in the reign of Henry VIII., was that of extravagance, in having his room strewed too frequently with rushes. The plant used on this occasion was probably the Sweet-sedge, which

* *Eriophorum*.

† *Acorus Calamus*.

must have been brought, at some considerable expense, from a great distance, as it does not grow in the vicinity of London. Rushes * are now used for making mats and brooms; and the pith, strengthened by a narrow strip of rind, proves an excellent wick for candles which are required to burn for a long time without consuming much tallow, or giving much light. The rushes used for the bottoms of chairs belong to an entirely different tribe of plants, growing also in marshy places, and called *Bulrushes* or *Clubrushes*.† The flower of the Rush is inconspicuous, but not altogether unworthy of notice. It approaches very closely in its structure to the beautiful Lily tribe; the principal difference being that it has dry and rigid petals, or calyx leaves, the number and arrangement of which is the same in both.

Contrary to what we might expect, aquatic plants, however thick the substance of their stems and leaves may appear, are remarkable for the quantity of *air* contained in their cells, and not for any exuberance of moisture. We can easily see the reason of this, when we recollect, that as they grow either in the immediate vicinity of water, or actually in water, they do not stand in need of reservoirs of juices. They are more liable to sudden floods than excessive droughts; they are therefore abundantly supplied with cells filled with air, which keep them buoyant, however high the water may rise. On the contrary, plants which thrive in very dry situations have a ready power of absorbing moisture from the atmosphere, which they also eagerly retain. The Cactus tribe

* *Juncus*.

† *Scirpus*.

flourish in arid situations, where one would suppose that no vegetable could long exist. For a short time only they are exposed to rain, and then they put forth their splendid flowers. During the remainder of the year their roots serve only to fix them to the soil, which is too dry to afford them any nourishment; but, notwithstanding this, they are then quite as juicy and as vigorous as if they grew in the most highly favoured soil.

The celebrated traveller Humboldt gives the following description of a tree, the *Palo de vaca* or Cow-Tree, of South America, an account of which will serve well to illustrate my subject. He says: "On the barren flank of a rock grows a tree, with coriaceous * and seemingly dry leaves. Its large woody roots can scarcely penetrate into the stone. For several months in the year, not a shower moistens its foliage. Its branches appear dead and dried; but, when the trunk is pierced, there flows from it a sweet and nourishing milk. It is at the rising of the sun that this vegetable fountain is most abundant. The blacks and natives are then seen hastening from all quarters, furnished with large bowls to receive the milk, which grows yellow, and thickens at its surface. Some employ their bowls under the tree itself, others carry the juice home to their children. We seem to see the family of a shepherd, who distributes the milk of his flock." A tribe of plants common in our country, the Stone-crops, is scarcely less remarkable. They have very succulent stems and leaves, though growing in situations where for long periods they must be deprived of any nutri-

* Like leather.

ment through their roots. One species particularly, *Sedum Telephium*, the "Orpine growing still," of Spenser, will live for several months, though suspended by a string from the ceiling of a room. I have even known it send out vigorous shoots, after having been pressed between sheets of paper, and placed in an herbarium. All these plants are abundantly furnished with pores for imbibing moisture from the atmosphere, but scantily provided with perspiratory vessels. On the contrary, aquatic plants readily part with their moisture, which they absorb principally by the under surface of their leaves, and transmit through the upper. A Water-lily, or a stem of Forget-me-not, will begin to wither immediately that it is removed from its native haunts.

On the skirts of bogs are to be found, not unfrequently, the greater and less Skull-cap;* these two plants afford a beautiful example of the care exercised by Nature in protecting the ripening seed. The *corolla* (or coloured portion of the flower) consists of one tubular petal; and the *calyx* is shaped like a cup, the upper rim of which is larger than the lower, and contains within it four seeds not protected by a common seed-vessel. As soon as the corolla has fallen off, the upper rim of the calyx gradually bends down upon the lower, and continues to grow until it has perfectly filled up the opening; so that the seeds, which would otherwise be exposed to rain and dew, are as effectually sheltered as if they were enclosed in the most compact seed-vessel. When the seeds are ripe, the lid rises, and suffers them to escape.

* *Scutellaria galericulata* and *S. minor*.

Among the most beautiful of bog-plants, (for beautiful flowers are to be found even here,) are the minute *Radiola*, shaped like a shrub, and bearing from twenty to a hundred or more flowers, yet rarely attaining the height of two inches; the pink Pimpernel,* forming as beautiful an ornament of this unsightly region, as the scarlet Pimpernel does in the rich pasture land; Buck-bean,† choosing always to grow in places where he may display his elegant pink buds, and his petals beautifully fringed with white filaments, in contrast with dingy water or liquid mud; and lastly, every body's friend, the blue "Forget-me-not,"‡ reminding us, whether we see it here, on the river's bank, or fringing the stream by the road-side, of the loved and absent.

In ponds we may frequently see, in the month of May, a profusion of bright green three-lobed leaves, interspersed with glossy-white flowers, all floating on the surface of the water. This is the Water Crow-foot,§ and is worthy of note, not only for the pretty showiness of its flowers, but on account of the singular form of its leaves. It grows very frequently in those parts of rivers which, though well supplied with water during winter, are in summer liable to be deserted by the running stream and converted into ponds. Plants which flower just above the surface of the water,—the white and yellow Water-lilies, for example,—are supported by spreading leaves sufficiently buoyant to sustain the whole plant. Now, it is evident that a submersed plant, furnished with such leaves, and growing in

* *Anagallis tenella*.

† *Myosotis palustris*.

‡ *Menyanthes trifoliata*.

§ *Ranunculus aquatilis*.

a river, the current of which is at all rapid, would very soon be stripped of its foliage; and, deprived of this, the stem would not elongate, so that the plant would never reach the surface of the water to blossom. To obviate this difficulty apparently, a wise Providence has ordered that, so long as the stem remains under water, it shall bear no expanded leaves, but a vast number of capillary fibres, resembling the leaves of Fennel. These wave to and fro in the water, and, offering little resistance, are uninjured by the most violent floods. But when the water has retired, and the extremity of the stem reaches the surface, the plant seems endowed with a new power; the leaves, which it now sends out, are no longer capillary, but dilated and nearly round, eminently adapted for floating, themselves, and for buoying up the still submersed stem. Sometimes it grows at the bottom of rivers in places where a strong current runs all the year round. In such situations it retains the same characters throughout the whole of its existence; but that the tendency still exists to produce differently shaped leaves under altered circumstances, may be discovered by examining the banks of a river which has had the soil taken from its bed thrown on them. Here, if the bank be but moderately damp, we shall in all probability find plants sending out three-lobed leaves, and white flowers, as if such a situation were the best adapted for their perfect developement. Growing in a pond, the water of which is still at all seasons, the submersed part of the stem produces capillary leaves, although there is not in such cases so obvious a reason for this peculiar formation. Water, whether moving or stagnant, appears to excite in the plant

a tendency to produce capillary leaves; this tendency being, in the former case, of the greatest benefit to the plant, in the latter not prejudicial. Possibly, indeed, the large exposure of surface to the water, consequent on the repeated subdivision of the leaves, may be necessary to the perfection of the plant, whether it grow in rivers or in ponds. If this be the case, we have an additional reason for admiring the wisdom "which serves to further, too, some other use."

Other aquatic plants, besides that just described, are remarkable for their peculiar adaptation to the element in which they grow. "The Broad-leaved Pond-weed"* is one of them. You have, pro-



POND-WEED.

bably, observed its large elliptical leaves floating on the surface of the water, and lying so flat that they scarcely seem attached to any stem. The upper side of the leaf appears to be covered with some substance which repels water, for let it rain as hard as it will, or let the leaf be sunk, and held

* *Potamogeton natans*.

under the water some minutes, it remains perfectly dry. This property helps to keep it afloat; but this is not all: the leaf and leaf-stem are not juicy, like those of land-plants, but are composed of an infinite number of cells, filled with air; the stems too are very long and flexible, so that, whether the water rise or sink, the leaves always rest on the surface. The lower leaves of this plant, as well as those of the Water Crow-foot, are different from the upper, being exceedingly long and narrow. They never reach the surface, yet they are prevented from lying at the bottom of the pond in which they grow, by their cellular structure, resembling in this respect the floating leaves.

Several plants belonging to the genus *Utricularia*, or Bladder-wort, are furnished exclusively with leaves like the submersed leaves of the "Water Crow-foot," no part of the plant rising out of the water but the flower and its stalk. Instead of having floating leaves, the root, stems, and leaves are thickly beset with small bladders, which, except during the flowering season, are filled with water. When, however, it is necessary that the plant should rise to the surface, for the sake of expanding its blossoms, the water in the bladders is displaced by air, the plant rises, shoots up its flower-stalk, the blossom expands and fades; when the bladders become again filled with water, and the plant descends to ripen its seeds at the bottom.

It matters not, then, whithersoever you turn your eyes; you will everywhere detect the watchful presence of God:

"Each tree and leaf doth know
I AM."

Whether we look at the giant Oak, or examine the construction of the minute air-vessels in yonder seemingly worthless weed, we shall not fail to discover that all things are equally fitted by Him to the purposes for which they were created. Magnitude and duration do not ennoble anything in the sight of Him that inhabiteth eternity.

Beneath Thy all-directing nod,
Both worlds and worms are equal, God !
Thy hand the comets' orbits drew,
And lighted yonder glow-worm too ;
Thou didst the dome of heaven build up,
And form'dst yon Snow-drop's silver cup.

BOWRING.



CHAPTER VIII.

THE SEA-SHORE.

What hid'st thou in thy treasure-caves and cells,
Thou ever-sounding and mysterious Main?

MRS. HEMANS.

OUR Botanical rambles have already introduced to our notice a large number of plants, so wonderful in their structure and design, that we can scarcely conceive it possible, if experience did not contradict us, that men could ever have doubted the omnipresence of a Great First Cause. But, numerous and all-convincing as the examples are which we have already adduced, the total forms but a minute portion of what an every-day walk may present to an eye that will "see and understand;" and, when the wonders of the land are exhausted, we may turn to the sea, and detect, in the prolific garniture of its rocks, an overwhelming abundance of organized bodies, attesting, in a new language, the first article of our faith,—the Unity, Benevolence, and Almighty Power of our Creator.

Some of these we shall soon have an opportunity of examining. We might advantageously devote some time to the collecting of the flowering plants which ornament the rugged sides of the cliffs, or bind together the shifting substance of yonder sand-hills. My object, however, being to direct your attention principally to the actual produce of

the sea, we will only take a passing glance at the most conspicuous of these. One of the prettiest is the Sea-pink,* or *Thrift*, so called from its *thriving* in nearly all situations. You are, no doubt, familiar with it as an edging of garden-beds. In such situations it produces longer leaves, of a brighter green, than when it grows on the sea-shore, and flowers of a deeper rose-colour. There, of course, it is merely a visitor; but it is very commonly met with at a great distance from the sea, growing naturally high up among the mountains, when it assumes the habit of Alpine plants, in producing large flowers slightly elevated above the surface of the ground. This capability of flourishing on the sea-shore, as well as in mountainous districts, is not peculiar to Thrift, for the Sea-campion† (with, perhaps, some others,) is remarkable for choosing the same places of growth. I am not aware that either of these grows spontaneously in any intermediate locality; nor can I assign any reason for this peculiarity. Some light would probably be thrown on the subject, were the stems of each to be analyzed, and the result duly recorded; in which case the presence or absence of the salts, generally found to enter into the composition of marine plants, would afford a foundation for establishing some theory.

The Yellow Horn-poppy‡ is conspicuous for its large gaudy flowers, and for its seed-vessels, which are remarkably long, but scarcely exceed in diameter the stems which support them. The Sea-convolvulus§ will be sure to attract your attention, delighting, as it does, to expand its large

* *Statice Armeria.*

‡ *Glaucium luteum.*

† *Silene maritima.*

§ *Convolvulus Soldanella.*

striped flowers on the sloping bank of some dry sand-hill, where, during the summer months, it presents to the sun a constant succession of beautiful but short-lived blossoms. In its immediate vicinity, you will probably find, in full luxuriance, the Eryngo,* or Sea Holly, protected at all points with bristling armour, and easily discovered, at a considerable distance, by the bluish hue of its leaves. Samphire,† which is frequently sent to table as a pickle, is another sea-side plant; not however growing, like the last, on sand, but preferring the steep sides of rocks, which in stormy weather are actually sprinkled with salt water. A large number of curious plants grow in salt marshes, and on the muddy shores of rivers. They are not remarkable for their beauty; and, as we have much to interest us on the sea-shore itself, I shall leave you to examine them when you have made some proficiency in Botany.

The term *Algæ* is applied by Botanists to all marine plants—that is to say, to all such as grow at the bottom of the sea, or between the levels of high and low water—as well as to many kinds growing in fresh water. The structure of all these is exceedingly simple. Examples of the latter you will have in the green masses, composed of tangled threads, which you may see in every stagnant pond; we may become acquainted with a vast number of the former in the course of half an hour's walk.

In ancient times, when a person wished to express utter contempt of a thing, seemingly unfit for any purpose, he would say, “as worthless as

* *Eryngium maritimum*.

† *Crithmum maritimum*.

sea-weed.”* Before we presume to join in this very harsh opinion, we ought to descend to the bottom of the ocean, and wander through the groves and meadows of the sub-marine world, to watch the habits, food, and growth of the countless inhabitants of the deep; and then perhaps we might form a conclusion more in accordance with the great truth, that the All-wise Creator has made nothing in vain. But, this being impossible, we must rest content with merely inferring from analogy, that the depths of the sea may possibly produce weeds to be the food of marine animals, as the face of the earth brings forth green herbs to be the food of land animals. But the Roman poet, who uses the expression given above, alluded probably to the uselessness of these *Algæ* to *man*. Yonder countrymen, with their mules and panniers, are seemingly of a very different opinion. They have been at the pains of cutting a winding path along the face of the rocky cliff solely for the purpose of carrying off the great heaps of sea-weed, cast on shore whenever a storm occurs. You will ask, of course, “To what use do they apply it, after they have devoted so much time and trouble to its removal?” It is deposited in large heaps on the arable lands, where it is suffered to remain until decomposition has taken place, and at the proper season is spread on the ground, and forms a valuable manure. So highly is it esteemed, that, in districts where the land is not much elevated above the surface of the sea, whenever a storm takes place, the people flock down to the coast, with vehicles of all descriptions, to collect

* *Algæ projectâ vilior.*

the precious tribute of the deep. Horses, mules, donkeys, and oxen are all pressed into the service, which, owing to the sinking of the wheels in the sand, is most laborious. They do not, in general, immediately carry off to their farms what is collected; but each party appropriates a spot beyond the reach of the tide, where a temporary store is formed, to be removed at leisure.

Here we have, then, one use to which this "worthless Alga" is applied. Another, and a yet more important application of it, is to the manufacture of *Kelp*, a substance extensively used in glass-making, and soap-boiling. Kelp is an impure carbonate of soda, and is procured from the ashes of various kinds of sea-weed. "The plants are cut from the rocks, or collected from the rejectamenta of the sea, and dried in the open air. An excavation, like a grave, is made in the ground and lined with large stones; and in this, which is named a Kelp-kiln, the dried weeds are burned. The melted alkali, mixed with many impurities, accumulates in the bottom of the kiln, and, when cold, forms a hard bluish mass, which is named Kelp, and is a substance of great importance in bleaching, and, as before stated, in the manufacture of soap and glass.

"Almost the entire rent of the island of Rathlin, on the northern coast of Ireland, is thus paid from the produce of its sea-weeds; and from this source alone, the rents of one Highland chief of late years, it is said, increased two thousand pounds per annum."*

When first the manufacture of kelp was intro-

* Drummond's First Steps to Botany, p. 355.

duced into the Orkneys, the country-people opposed it with the greatest vehemence. " Their ancestors had never thought of making kelp, and it would appear that they themselves had no wish to render their posterity wiser in this matter. So violent and unanimous was their opposition to the individuals employed in this work, that it was found needful to obtain protection from the officers of justice for the individuals employed in the work. Several trials were the consequences of these outrages, which were justified on the plea, ' that the suffocating smoke that issued from the kelp-kilns would sicken or kill every species of fish on the coast, or drive them into the ocean, far beyond the reach of the fishermen, blast the corn and the grass on their farms, and introduce diseases of various kinds.' The influential persons, however, who had taken an interest in the matter, succeeded in establishing the manufacture; and the benefits which accrued to the community soon wrought a change in the public feeling. The value of estates possessing a sea-coast well stocked with sea-weed increased so much, that, where the plants did not grow naturally, attempts were made, and not without success, to cultivate them by covering the sandy bays with large stones. By this method a crop was obtained in about three years, the sea appearing to abound everywhere with the necessary seeds." *

The sea-weeds also contain a substance, called Iodine, which is invaluable as a medicine. It derives its name from a Greek word signifying *a violet*, from the peculiar hue of the vapour which

* Greville's *Algæ Britannicæ*.

it emits when heated. Polished plates of silver held over these fumes are peculiarly sensitive of light, and are used in taking likenesses by the process called the Daguerreotype.

Some species also contribute to the comfort of man, by supplying him with food. The "Carrageen Moss,"* sold in druggists' shops, is nothing more



CARRAGEEN MOSS.

than dried sea-weed, growing abundantly on most of our coasts. Another species† is stewed, and,

* *Chondrus crispus*.

† *Porphyra laciniata*.

under the name of Laver, is brought to our tables, and by some considered a delicacy. One or two of the larger species are eaten raw by the poorer classes in Ireland and Scotland.

While walking round the coast near the Giant's Causeway, I once observed a number of men and women busily employed near the water's edge; and, on inquiring of my guide, found that they were providing themselves with food for their next meal. Being curious to discover what kind of fare the rocks afforded, I stopped one of the men, who was going home with his bundle, and asked him to give me a bit to taste, prepared in the way in which it was generally eaten. He accordingly stripped off all the expanded part of a long and narrow leaf,* and presented me with the stem, or mid-rib. It was, I must confess, as good as I expected; but, at best, a very sorry substitute for a raw carrot, combining with the hardness of the latter the fishy and coppery flavour of an oyster. I made a very slight repast, as you may suppose, and, after having given the man a few pence for his civility, continued my walk. My guide, however, seemed to think, that, if I did not choose to enjoy to the full the advantage which I had purchased, there was no reason why he should not. He accordingly stayed behind for a minute or two, and, when he rejoined me, was loaded with a supply of the same plant, which he continued to munch with much apparent relish as we pursued our walk.

The edible nests, which are constructed by several species of swallow in Java, are generally believed to be composed of a substance collected

* *Alaria esculenta*.

from sea-weed. They are occasionally brought to England, but are too highly prized in China, where they are imported in great quantities, to become an important article of commerce; the purest being frequently sold for their weight in gold. "The collecting of birds' nests appears, from Mr. Crawford's account, to be as perilous a toil as our fearful trade of gathering samphire; for, he says, the nests are obtained in deep and damp caves, and are most esteemed if taken before the birds have laid their eggs. The coarsest are those which are collected after the young have been fledged. The finest nests are the whitest, that is, those that are not defiled by the young birds. They are taken twice a-year, and if regularly collected, and if no unnecessary injury be offered to the caverns, the produce is very equal, and the harvest very little, if at all, improved by being left unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. In one place, the caves are only to be approached by a perpendicular descent of many hundred feet, by ladders of bamboo and rattan, over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed by torch-light, by penetrating into the recesses of the rock, where the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf, making its way into the chasms of the rock."

The fresh-water Algæ, besides supplying fish with an inexhaustible stock of food, are of great

service in purifying the water in which they grow. This end they effect in two ways,—first, by appropriating for their own support the foul matter, which would render the water putrid and incapable of supporting animal life; and, secondly, by evolving *oxygen*, or vital air, which renders the water fit for the respiration of fishes. Their thread-like stems may be frequently discovered, thickly invested with brilliant globules, which, when the water is disturbed, rise to the surface, and discharge their contents into the air. Some of the smaller kinds, the substance of which is gelatinous, exercise a mechanical action, by arresting particles of impure matter, which are carried against them by the water, and retaining them at the bottom. Hence it happens that the water of running streams is often perfectly pure, though the smooth pebbles over which it flows are thickly coated with slime and mud.

You have no doubt observed a green vegetable substance, clothing the damp walls of cellars, &c. This belongs also to the Algæ, and is not without its use. “It forms,” says Sir James E. Smith, “in the wet months of winter a verdant tapestry on damp walls and stones, in confined areas, and dark subterranean buildings in which the inhabitants of crowded cities gasp for air, the effects of which on the atmosphere, by rendering it something more respirable, must be as beneficial as those observed to be produced by analogous species on corrupted water.”

“But, were the Algæ really serviceable, neither in supplying the wants, nor administering to the comforts of mankind, in any other respect, their character would be redeemed by their usefulness

in the arts. One species is invaluable to the Chinese as a glue and varnish. Though a small plant, the quantity annually imported at Canton is stated to be about 29,000lbs. It is sold at Canton for 6d. or 8d. per pound, and is used for the purposes to which we apply glue, and gum-arabic. The Chinese employ it chiefly in the manufacture of lanterns to strengthen or varnish the paper, and sometimes to give a gloss to gauze or silks."*

Botanists have arranged and named all the discovered species of Algæ which grow in the sea, in fresh water, and on land. Some of these, however, are so minute, and others vary so much at different seasons of the year, that I would not recommend you to study them, until you have acquired habits of accuracy in the examination of specimens, by dissecting land plants.

All the sea-weeds, properly so called, appear to depend principally for their sustenance upon the water in which they float. Many of them have no perceptible roots, being merely fixed to the rocks by the lower extremity of their stems; some are attached by a small disc, shaped like a button; while those, the stems of which are subdivided at the base, in a manner somewhat resembling roots, seem rather to require them as an additional security against the violence of the waves, than to employ them as a means of subsistence. The large seaweeds, called "Tangles,"† or "Sea-girdles," afford a remarkable example of such a root. The plant is composed of a long cylindrical stem, about the size of an ordinary walking-stick; its upper extremity

* Dr. Greville.

† *Laminaria digitata*.

expands into and forms a bunch of stout leathery strips, which must present a large surface to the



SEA-TANGLES.

water, and therefore require to be attached strongly to the rock. This object is effected by the lower portion of the stem being subdivided into a great number of ramifications, scarcely larger than whip-cord, each of which clings most tenaciously to the rock. In spite of this, however, of all the various

kinds of sea-weeds which are thrown on shore during a storm, Tangles are the most abundant, and for this reason (at least I know no other): a species of limpet (*Patella lavis*) fixes itself on the roots of the young plants, and feeds on their substance. Like the common limpet, it never changes its place of abode; but, as it grows older, enlarges its chamber, not only eating deeper into the stem, but widening its cell on all sides. It thus destroys the divisions of the root one after another, till the plant is so weakened in its hold on the rock, that the violent action of the water on its tufted head tears it away, and carries it, with its insidious but imprudent tenant, to the shore. I will not go so far as to say, that all the Tangles thrown ashore owe their destruction to these limpets; but, if you examine their roots within a short time after they have quitted the water, you will discover many which have been eaten away in the manner described; and indeed, in numerous instances, the shells, with their inhabitants yet alive, adhering to them. The young plants of this species are eaten in Scotland, and, within the last twenty years, were sold in the streets of Edinburgh. When cooked, the young stalks are not unpleasant; and, in some places, cattle are fed upon this plant, when it has been boiled. The stems are sometimes made into knife-handles, which, after a few months' exposure to the air, become hard and shrivelled, and scarcely to be distinguished from hartshorn. A stem with its appendage of leaves is sometimes dried, and hung up by countrymen in their cottages, and serves to indicate an approaching change of weather, becoming damp and flaccid when the atmosphere is highly charged with moisture,

and recovering its rigid character on the return of dry weather. "In some places of the western islands in Scotland, it forms even a sort of soil on the pebbles of the beach, on which the poor natives sow barley; and, as the sea-weed rots, the grain drops with it into the interstices, so that, when the harvest is ready, it is seen growing on a surface of naked polished pebbles."—*Berwick Flora*.

It is a plant of very rapid growth, as appears from the following narrative related by Mr. Neill: "A stone beacon was being erected on a low rock called the *Carr*, near the entrance of the Frith of Forth. This rock is about twenty feet broad, and sixty feet long; and is only uncovered at the lowest ebb of spring-tides. It was at this time completely covered with the larger Algæ, especially *Fucus esculentus*,* and Sea-Tangles. By the necessary preparations for the beacon, these were all cleared off, and the rock reduced to a bare state by the beginning of November, 1813, when it was obliged to be abandoned for the winter. The coating of seaweed had at first been cut away by the workmen, the roots or bases afterwards trampled by their feet, and much of the surface of the rock had been chiselled. Upon returning to the Carr, in May, 1814, in order to recommence operations, it was matter of no slight surprise to find the surface again as completely invested with large sea-weeds as ever it was, although little more than six months had elapsed since the work had been left off, when, as already said, the rock had been cleared of weed. In particular, it was observed that many newly produced specimens of *Fucus esculentus* measured

* *Alaria esculenta*.

six feet in length. The Tangle was only about two feet long. It is to be observed, that the specimens here alluded to, were taken from that part of the surface of the rock which had been dressed off with the pick or chisel the preceding autumn; they had therefore grown from the seed."

The plant called Sea-laces, or Sea-whips, affords a remarkable example of an elongated stem, which sends out neither branches nor leaves throughout its whole extent. It consists of a simple tube, of about the thickness of whip-cord, hollow and internally jointed. The cavities are filled with air, and serve to keep the plant buoyant. It often attains the length of thirty or forty feet, and grows in such abundance as sometimes to impede the progress of boats, as the extremities rise to the surface wherever the water is sufficiently shallow to allow them.

These two grow only in places which are rarely or never deserted by the water; but there are very many species which grow on parts of the sea-coast that are uncovered at every ebb of the tide. One of the most abundant of these is the *Knotted Fucus*,* called, from the quantity of kelp which it contains, *kelp-wrack*. It is easily distinguished by the large oblong air-vessels or bladders, externally resembling berries, which are scattered throughout the whole of its length. These serve the same purpose as the hollow tube of the last mentioned, and are largest and most numerous when the plant grows in deep water, for then it attains a very great length, and would seem to require a greater degree of buoyancy. They are

* *Fucus nodosus*.

sometimes made into whistles by children, whence the plant is called *Sea-whistles*. If put into the fire, they burst with a loud report.

Another species,* which grows in similar situations, differs from this in having a more dilated stem, of a thinner substance, and more numerous air-bladders, which are, however, smaller. You can scarcely walk on a weedy sea-shore without treading on the latter, which crack under the feet at every step. Like the last, it is extensively used in the manufacture of kelp. "In the Isles of Jura and Skye it is frequently a winter food for cattle, which regularly come down to the shores at the receding of the tide to seek for it; and sometimes even the deer have been known to descend from the mountains to the sea-side to feed upon this plant. Linnæus informs us that the inhabitants of Gothland, in Sweden, boil it with water, and, mixing with it a little coarse meal or flour, feed their hogs upon it; for which reason they call the plant *Swintang*, or *Swine-tang*; and in *Suavia*, he says, the poor people cover their cottages with it, and use it for fuel. In Jura, and some other of the Hebrides, the inhabitants dry their cheeses without salt, by covering them with the ashes of this plant, which abounds so much in that substance, that from five ounces of the ashes may be procured two ounces and a half of fixed alkaline salts, or half their own weight." — *Sir W. J. Hooker*. Drummond says, that "the cattle go regularly down to the shore at ebb-tide, and feed on this and various other sea-weeds; and it is observed that they know their time exactly, even

* *Fucus vesiculosus*.

when far away from the sea, and not within view of it."

Among the sea-weed thrown on shore after a storm, you will frequently find a singularly shaped substance, which, at first sight, you will probably imagine to be a large beetle, and, on examination, will pronounce a detached portion of some marine plant. Both suppositions are equally erroneous: you see before you neither seaweed nor insect, but the outer integument of the egg of the *skate*. These *purses*, as they are called, when cast by the fish, may be described as oblong, leathery, or almost horny pouches, convex on both sides, and internally hollow, containing a substance bearing a close resemblance to the yolk and white of a bird's egg. The four horns which project from the angles are much longer in their natural



PURSE OF THE SKATE.

state than in the broken specimen from which the annexed drawing was made, two of them being slightly hooked. These latter seem designed to attach the incipient animal to the weed at

the bottom of the sea. When the fish has attained its perfect state, it escapes at one end, which opens readily from within, and it is in this state that the purse is generally cast ashore. Sometimes after a violent storm they may be found still containing the imperfect animal. Another fish common on our shores, the dog-fish, is propagated in the same way; but the purses, instead of being furnished with horns, terminate in elastic sinewy cords many feet long, which, in all probability, become entangled in the weeds at the bottom of the sea, and, while the tender animal is protected from the attacks of other marine animals by its horny covering, keep it fixed to its moorings in deep water. I am now trespassing, I know, on another branch of natural history, namely Zoology. I am induced, however, to make this brief notice, from having for a long time myself believed that sea-purses were of vegetable origin, and somewhat analogous to the air-vessels of the *Knotted Fucus*.

It very frequently happens during the hot summer months, that the sea-weeds, which grow between high and low water-mark, are exposed for many hours together to the direct rays of the sun, and are consequently liable to be scorched, and to become perfectly dry. The flowering plants, if reduced to such a state, could never be restored by the application of moisture; the mosses and lichens, as we have seen before, would recover their state of freshness, if but a portion of the plant were immersed in water. Now, the cases in which the latter plants might be partially exposed to moisture, are numerous, and hence we see the advantage which they derive from being

able to transmit fluids from one part to another. But we can scarcely conceive any circumstances under which the sea-weed would be liable to be only partially submersed. When the returning tide rose so high as to wet one portion of a plant, it would necessarily be high enough to cover the whole; and consequently, in the case of sea-weeds, no provision is made for the transmission of fluids through the whole extent of the plant, each part only recovering its freshness as it becomes immersed. One kind, approaching in habit some species of lichen, and therefore called *Lichina*, grows on rocks, which are only occasionally moistened by the sea-water; nevertheless, it suffers no detriment from its prolonged and often-repeated abstinence, but on the first sprinkling of a few drops of spray immediately recovers its vigour.



LICHINA PYGMÆA.

Natural size.

LICHINA PYGMÆA.

Magnified.

Very different from the above are a few species, which are, during the greater part of their existence, attached to no solid substance, but float about at or near the surface of the sea. The most remarkable of them is the "*Sargassum vulgare*," the "*Tropic Grape*" of sailors. It is

worthy of attention, not only from its wandering habits, quitting as it does the sub-marine soil, to which in its early stages it is attached, but also for the amazing profusion in which it is frequently found. It only grows within forty degrees of latitude on either side of the equator; but currents often cast it on our coast. It is a very remarkable circumstance in the history of this plant, that it is chiefly local in its position, even when detached, forming two great banks, one of which is usually crossed by vessels homeward bound from Monte Video, or the Cape of Good Hope; and so constant are they in their places that they assist the Spanish pilots to rectify their longitude. It is probable that these banks were known to the Phœnicians, who in thirty days' sail, with an easterly wind, came into what they called "the Weedy Sea;" and to the present day, by the Spaniards and Portuguese, the chief tract is named *Mar de Zargasso*. It was the entering on such fields as these that struck so much terror into the minds of the first discoverers of America; for, sailing tardily through extensive meadows for days together, the sailors of Columbus "superstitiously believed that the hindrance was designed by Heaven to stay their adventurous course; hence they wildly urged their commander to proceed no further, declaring that, through the bands thus woven by nature, it would be presumptuous impiety to force a way."—*Burnett*.

"That these plants are produced within the tropics," remarks Dr. Greville, "there can hardly be a question: but at what depth they vegetate is still involved in obscurity. Neither is it clearly ascertained why the banks of weed should always

occur in the same places. The supposition, that they proceed with the gulf-stream from the Gulf of Mexico, (whence the original name of *Gulf-weed*,) is now exploded."

This plant, in all probability, attains a larger size than any other; and it is worthy of remark, that the smallest and simplest of vegetables belongs to the same natural order. Captain Ross, on his return from the Polar expedition in 1819, announced the discovery of mountains, some miles in length, which were covered to the depth of ten or twelve feet, with *red snow*. A similar phenomenon had been observed before in various parts of the world, having sometimes occasioned great alarm. The investigations of recent naturalists have satisfactorily proved, that this remarkable appearance is to be attributed to the presence of an exceedingly minute plant, of the very simplest conformation, vegetating in infinite profusion in the coloured substance. It is not agreed whether the plant is matured in the air, or whether it vegetates after it has fallen to the ground: if the latter be the case, its growth must be inconceivably rapid, it having happened that a district of many miles in extent has assumed a red hue in a single night. It seems, however, most probable, that the infinitely minute seeds are carried through the air like smoke or vapour, that they germinate by the influence of the moisture contained in the atmosphere, and are brought to the ground by the falling snow. Rain and dew have less frequently been observed of the same colour, sometimes in sufficient quantities to stain the water in pools, and to give it the appearance of being converted into blood. But not only have

we on record showers of rain, hail, and snow, tinged of a *red* colour, but they have been observed of other colours, viz. yellow, blue, and green. In some of these cases the phenomenon is produced by varieties of the same plant, differing only in their tint; in others there is also a slight difference in structure. In all, the substance of the plant consists of cells filled with a fluid which colours the whole.

These are a few among the many interesting objects which a sea-side ramble presents to our notice, and they are only a few. A close examination of a small extent of sea-shore, where sea-weed is plentiful, will prove to you that the "great deep" abounds in vegetables as various in form and colour, as in size; and the microscope will reveal to you wonders as great as the land can afford. Simple thread-like tubes — jointed filaments, the particles of which cohere by inconceivably minute points — tangled tufts, consisting of countless feathery stems — exquisitely veined leaves, all abounding with fructification as various as the plants themselves, wave to and fro in the little pools left among the rocks by the receding tide. And as to colour, you can scarcely name a tint which is not here to be met with, as brilliant and delicate as in the opening rose, or the full-blown cactus. Time will not serve me to particularize them; and indeed, I should find it very difficult to describe the minute kinds in such a way as to enable you to fix on the species which I had in view: but a cursory glance will be sufficient to teach you the same lesson which throughout all our rambles it has been my principal object to inculcate: that the meanest work in the Creation is

well worthy of our deepest research and admiration, not merely because it may lead to some useful discovery, but because the actual inquiry, while it compels us to engage in exercise healthful to the body, is equally beneficial to the mind—making us wiser, better, and happier. And senseless, indeed, must he be, who, after adding to his store of happiness by looking into the things of God's Creation, fails to discover that the knowledge and love of God, his *own* and *their* Creator, should be to him the source and spring of all his happiness. Can it be, that fallen man should feel his mind expand in the peaceful enjoyment of dissecting the puny herbs which Nature scatters everywhere in his way, and not rejoice in his moments of reflection that the GOD OF NATURE has revealed Himself also as the GOD OF PEACE? If, by searching into the laws by which He governs the universe, the mind attain a quiet and calm enjoyment as unmixed with evil as anything earthly can be, how much more conducive to his happiness must that knowledge be which “maketh wise unto salvation!”

He prayeth best, who loveth best
All things both great and small,
For the Great God, who loveth us,
He made and loveth all.

COLERIDGE.

THE END.



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